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# Complete Hardware Guide for EX8208 Ethernet Switches



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# About This Topic Collection

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- Documentation Symbols Key on page xxiv
- Documentation Feedback on page xxv
- Requesting Technical Support on page xxvi

## How to Use This Guide

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Complete documentation for the EX Series product family is provided on webpages at [http://www.juniper.net/techpubs/en\\_US/release-independent/information-products/pathway-pages/ex-series/product/index.html](http://www.juniper.net/techpubs/en_US/release-independent/information-products/pathway-pages/ex-series/product/index.html). We have selected content from these webpages and created a number of EX Series guides that collect related topics into a book-like format so that the information is easy to print and easy to download to your local computer.

This guide, *Complete Hardware Guide for EX8208 Switches*, collects together information about the EX8208 switches. The release notes are at [http://www.juniper.net/techpubs/en\\_US/junos10.3/information-products/topic-collections/release-notes/10.3/junos-release-notes-10.3.pdf](http://www.juniper.net/techpubs/en_US/junos10.3/information-products/topic-collections/release-notes/10.3/junos-release-notes-10.3.pdf).

## List of EX Series Guides for Junos OS Release 10.3

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Title	Description
<i>Complete Hardware Guide for EX2200 Switches</i>	Component descriptions, site preparation, installation, replacement, and safety and compliance information for EX2200 switches
<i>Complete Hardware Guide for EX3200 and EX4200 Switches</i>	Component descriptions, site preparation, installation, replacement, and safety and compliance information for EX3200 and EX4200 switches
<i>Complete Hardware Guide for EX4500 Switches</i>	Component descriptions, site preparation, installation, replacement, and safety and compliance information for EX4500 switches

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Title	Description
<i>Complete Hardware Guide for EX8208 Switches</i>	Component descriptions, site preparation, installation, replacement, and safety and compliance information for EX8208 switches
<i>Complete Hardware Guide for EX8216 Switches</i>	Component descriptions, site preparation, installation, replacement, and safety and compliance information for EX8216 switches
<i>Complete Software Guide for Junos® OS for EX Series Switches, Release 10.3</i>	Software feature descriptions, configuration examples, and tasks for Junos OS for EX Series switches
<b>Software Topic Collections</b>	Software feature descriptions, configuration examples and tasks, and reference pages for configuration statements and operational commands (This information also appears in the <i>Complete Software Guide for Junos® OS for EX Series Switches, Release 10.3.</i> )
<i>JUNOS® OS for EX Series Switches, Release 10.3: Access Control</i>	
<i>JUNOS® OS for EX Series Switches, Release 10.3: Configuration Management</i>	
<i>JUNOS® OS for EX Series Switches, Release 10.3: Class of Service</i>	
<i>JUNOS® OS for EX Series Switches, Release 10.3: Device Security</i>	
<i>JUNOS® OS for EX Series Switches, Release 10.3: Ethernet Switching</i>	
<i>JUNOS® OS for EX Series Switches, Release 10.3: Interfaces</i>	
<i>JUNOS® OS for EX Series Switches, Release 10.3: Layer 3 Protocols</i>	
<i>JUNOS® OS for EX Series Switches, Release 10.3: MPLS</i>	
<i>JUNOS® OS for EX Series Switches, Release 10.3: Multicast</i>	
<i>JUNOS® OS for EX Series Switches, Release 10.3: Network Management and Monitoring</i>	
<i>JUNOS® OS for EX Series Switches, Release 10.3: Port Security</i>	
<i>JUNOS® OS for EX Series Switches, Release 10.3: Power Management</i>	
<i>JUNOS® OS for EX Series Switches, Release 10.3: Routing Policy and Packet Filtering</i>	
<i>JUNOS® OS for EX Series Switches, Release 10.3: Software Installation</i>	

Title	Description
<i>JUNOS® OS for EX Series Switches, Release 10.3: Spanning-Tree Protocols</i>	
<i>JUNOS® OS for EX Series Switches, Release 10.3: System Monitoring</i>	
<i>JUNOS® OS for EX Series Switches, Release 10.3: System Services</i>	
<i>JUNOS® OS for EX Series Switches, Release 10.3: System Setup</i>	
<i>JUNOS® OS for EX Series Switches, Release 10.3: User and Access Management</i>	
<i>JUNOS® OS for EX Series Switches, Release 10.3: User Interfaces</i>	
<i>JUNOS® OS for EX Series Switches, Release 10.3: Virtual Chassis</i>	

## Downloading Software

You can download Junos OS for EX Series switches from the Download Software area at <http://www.juniper.net/customers/support/> . To download the software, you must have a Juniper Networks user account. For information about obtaining an account, see <http://www.juniper.net/entitlement/setupAccountInfo.do>.

## Documentation Symbols Key

Notice Icons		
Icon	Meaning	Description
	Informational note	Indicates important features or instructions.
	Caution	Indicates a situation that might result in loss of data or hardware damage.
	Warning	Alerts you to the risk of personal injury or death.
	Laser warning	Alerts you to the risk of personal injury from a laser.

Text and Syntax Conventions		
Convention	Description	Examples
<b>Bold text like this</b>	Represents text that you type.	To enter configuration mode, type the <b>configure</b> command:  user@host> <b>configure</b>
Fixed-width text like this	Represents output that appears on the terminal screen.	user@host> <b>show chassis alarms</b> No alarms currently active
<i>Italic text like this</i>	<ul style="list-style-type: none"> <li>Introduces important new terms.</li> <li>Identifies book names.</li> <li>Identifies RFC and Internet draft titles.</li> </ul>	<ul style="list-style-type: none"> <li>A policy <i>term</i> is a named structure that defines match conditions and actions.</li> <li><i>Junos System Basics Configuration Guide</i></li> <li>RFC 1997, <i>BGP Communities Attribute</i></li> </ul>
<i>Italic text like this</i>	Represents variables (options for which you substitute a value) in commands or configuration statements.	Configure the machine's domain name:  [edit] root@# <b>set system domain-name</b> <i>domain-name</i>
Plain text like this	Represents names of configuration statements, commands, files, and directories; IP addresses; configuration hierarchy levels; or labels on routing platform components.	<ul style="list-style-type: none"> <li>To configure a stub area, include the <b>stub</b> statement at the [edit protocols ospf area area-id] hierarchy level.</li> <li>The console port is labeled <b>CONSOLE</b>.</li> </ul>
< > (angle brackets)	Enclose optional keywords or variables.	<b>stub</b> <default-metric <i>metric</i> >;

Text and Syntax Conventions		
Convention	Description	Examples
(pipe symbol)	Indicates a choice between the mutually exclusive keywords or variables on either side of the symbol. The set of choices is often enclosed in parentheses for clarity.	<b>broadcast   multicast</b>  <b>(string1   string2   string3)</b>
# (pound sign)	Indicates a comment specified on the same line as the configuration statement to which it applies.	<b>rsvp { # Required for dynamic MPLS only</b>
[ ] (square brackets)	Enclose a variable for which you can substitute one or more values.	<b>community name members [ community-ids ]</b>
Indentation and braces ( { } )	Identify a level in the configuration hierarchy.	<pre>[edit] routing-options {   static {     route default {       nexthop address;       retain;     }   } }</pre>
;(semicolon)	Identifies a leaf statement at a configuration hierarchy level.	
J-Web GUI Conventions		
<b>Bold text like this</b>	Represents J-Web graphical user interface (GUI) items you click or select.	<ul style="list-style-type: none"> <li>In the Logical Interfaces box, select <b>All Interfaces</b>.</li> <li>To cancel the configuration, click <b>Cancel</b>.</li> </ul>
> (bold right angle bracket)	Separates levels in a hierarchy of J-Web selections.	In the configuration editor hierarchy, select <b>Protocols&gt;Ospf</b> .

## Documentation Feedback

We encourage you to provide feedback, comments, and suggestions so that we can improve the documentation. Send e-mail to [techpubs-comments@juniper.net](mailto:techpubs-comments@juniper.net) with the following:

- Document URL or title
- Page number if applicable
- Software version
- Your name and company

## Requesting Technical Support

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Technical product support is available through the Juniper Networks Technical Assistance Center (JTAC). If you are a customer with an active J-Care or JNASC support contract, or are covered under warranty, and need post-sales technical support, you can access our tools and resources online or open a case with JTAC.

- JTAC policies—For a complete understanding of our JTAC procedures and policies, review the JTAC User Guide located at <http://www.juniper.net/us/en/local/pdf/resource-guides/7100059-en.pdf> .
- Product warranties—For product warranty information, visit <http://www.juniper.net/support/warranty/> .
- JTAC hours of operation—The JTAC centers have resources available 24 hours a day, 7 days a week, 365 days a year.

## Self-Help Online Tools and Resources

For quick and easy problem resolution, Juniper Networks has designed an online self-service portal called the Customer Support Center (CSC) that provides you with the following features:

- Find CSC offerings: <http://www.juniper.net/customers/support/>
- Search for known bugs: <http://www2.juniper.net/kb/>
- Find product documentation: <http://www.juniper.net/techpubs/>
- Find solutions and answer questions using our Knowledge Base: <http://kb.juniper.net/>
- Download the latest versions of software and review release notes: <http://www.juniper.net/customers/csc/software/>
- Search technical bulletins for relevant hardware and software notifications: <https://www.juniper.net/alerts/>
- Join and participate in the Juniper Networks Community Forum: <http://www.juniper.net/company/communities/>
- Open a case online in the CSC Case Management tool: <http://www.juniper.net/cm/>

To verify service entitlement by product serial number, use our Serial Number Entitlement (SNE) Tool: <https://tools.juniper.net/SerialNumberEntitlementSearch/>

## Opening a Case with JTAC

You can open a case with JTAC on the Web or by telephone.

- Use the Case Management tool in the CSC at <http://www.juniper.net/cm/> .
- Call 1-888-314-JTAC (1-888-314-5822 toll-free in the USA, Canada, and Mexico).

For international or direct-dial options in countries without toll-free numbers, see <http://www.juniper.net/support/requesting-support.html> .

## PART 1

# Switch and Components Overview and Specifications

- EX8208 Switch Overview on page 3
- Component Descriptions on page 17
- Component Specifications on page 57





## CHAPTER 1

# EX8208 Switch Overview

- EX8208 Switch Hardware Overview on page 3
- EX8208 Switch Configurations on page 6
- Chassis Physical Specifications of an EX8208 Switch on page 9
- Understanding EX8208 Switch Component and Functionality Redundancy on page 11
- Slot Numbering for an EX8208 Switch on page 13

## EX8208 Switch Hardware Overview

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Juniper Networks EX8208 Ethernet Switches provide high performance, scalable connectivity, and carrier-class reliability for high-density environments such as campus-aggregation and data-center networks. The EX8208 switch is a modular system that provides high availability and redundancy for all major hardware components, including Routing Engines, switch fabric, fan tray, and power supplies.

You can manage EX8208 switches using the same interfaces that you use for managing other devices running the Juniper Networks Junos operating system (Junos OS)—the command-line interface (CLI), the J-Web graphical interface, and the Network and Security Manager (NSM).

- Software on page 3
- Chassis Physical Specifications on page 4
- Routing Engines and Switch Fabric on page 5
- Line Cards on page 5
- Cooling System on page 5
- Power Supplies on page 6

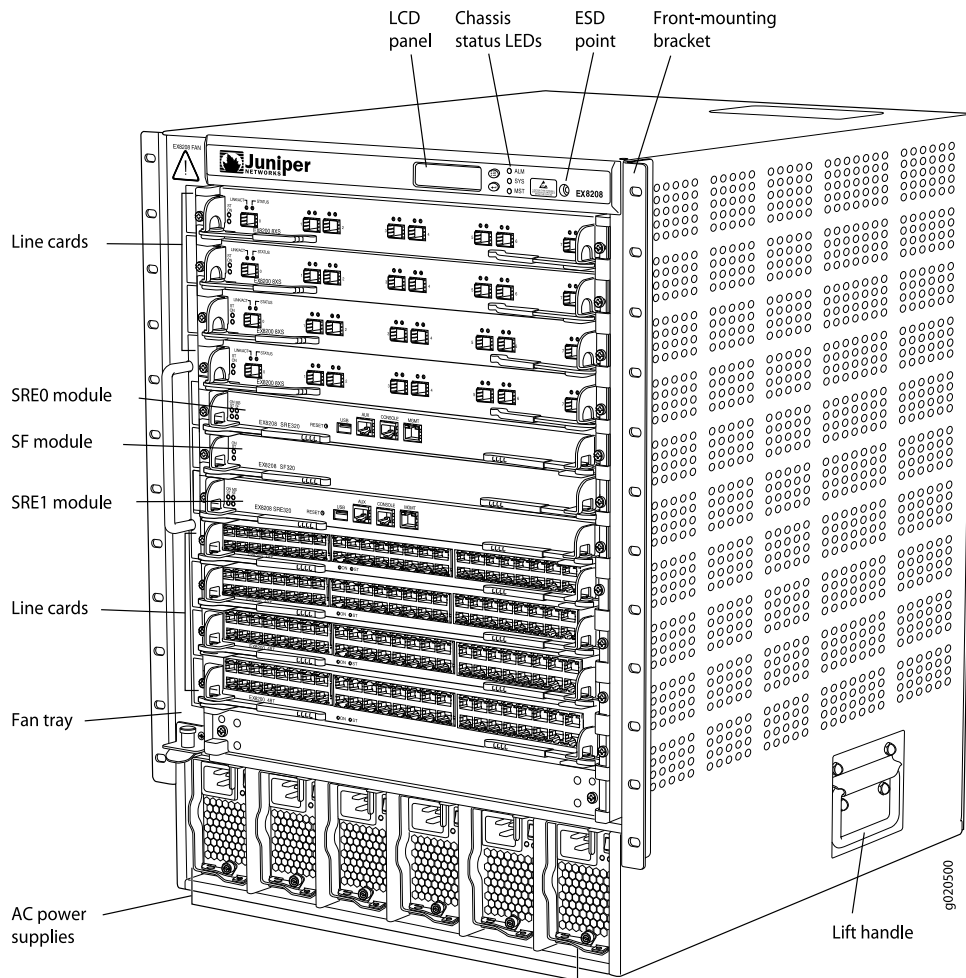
## Software

The Juniper Networks EX Series Ethernet Switches run under the Juniper Networks Junos OS, which provides Layer 2 and Layer 3 switching, routing, and security services. The same Junos OS code base that runs on EX Series switches also runs on all Juniper Networks J Series, M Series, MX Series, and T Series routers.

## Chassis Physical Specifications

The EX8208 switch is 14 rack units (14 U) in size (1/3 rack); three EX8208 switches can fit in a standard 42 U rack. Each EX8208 switch is designed to optimize rack space and cabling. See Figure 1 on page 4.

Figure 1: EX8208 Switch



The EX8208 switch has a chassis-level LCD panel that displays Routing Engine and switch fabric status as well as chassis components' alarm information for rapid problem identification. The LCD panel provides a user-friendly interface for performing initial switch configuration, rolling back a configuration, or restoring the switch to its default settings. See "LCD Panel in an EX8200 Switch" on page 17.

The EX8208 chassis backplane distributes the data, control, and management signals to various system components along with distributing power throughout the system.

See "Chassis Physical Specifications of an EX8208 Switch" on page 9.

## Routing Engines and Switch Fabric

Switching functionality, system management, and system control functions of an EX8208 switch are performed by a Switch Fabric and Routing Engine (SRE) module. See “Switch Fabric and Routing Engine (SRE) Module in an EX8208 Switch” on page 24. An SRE module contains a Routing Engine and switch fabric. The SRE modules are installed in the front of the chassis in the slots labeled SRE0 and SRE1. See “Slot Numbering for an EX8208 Switch” on page 13. A base configuration EX8208 switch has one SRE module. A redundant configuration EX8208 switch has a second SRE module. See “EX8208 Switch Configurations” on page 6.

The Switch Fabric (SF) module, working with the SRE module, provides the necessary switching functionality to a base configuration EX8208 switch. The SF module is installed in the front of the chassis in the slot labeled SF. In a redundant configuration the SF module provides a redundant switch fabric. The additional switch fabric provides full 2+1 switch fabric redundancy to the switch. See “Switch Fabric (SF) Module in an EX8208 Switch” on page 28.

## Line Cards

The EX8208 switch features eight horizontal line card slots and supports the line rate for each line card. The line cards in EX8200 switches combine a Packet Forwarding Engine and Ethernet interfaces on a single assembly. Line cards are field-replaceable units (FRUs) that can be installed in the line card slots labeled 0 through 7 on the front of the switch chassis. See “Slot Numbering for an EX8208 Switch” on page 13. All line cards are hot-removable and hot-insertable.

The following line cards are available for EX8208 switches:

- 8-port 10-Gigabit Ethernet SFP+ line card: This line card has eight 10-gigabit SFP+ ports on its faceplate in which you can install SFP+ transceivers. See “8-port SFP+ Line Card in an EX8200 Switch” on page 30.
- 40-port 10-Gigabit Ethernet SFP+ line card: This line card has 40 10-gigabit SFP+ ports on its faceplate in which you can install either SFP+ or SFP transceivers. See “40-port SFP+ Line Card in an EX8200 Switch” on page 31.
- 48-port 100/1000 SFP line card: This line card has 48 1-gigabit SFP ports on its faceplate in which you can install SFP transceivers. See “48-port SFP Line Card in an EX8200 Switch” on page 33.
- 48-port 10/100/1000 RJ-45 line card: This line card had 48 10/100/1000 Gigabit Ethernet ports with RJ-45 connectors on its faceplate. See “48-port RJ-45 Line Card in an EX8200 Switch” on page 34.

## Cooling System

The cooling system in an EX8208 switch consists of a hot-removable and hot-insertable fan tray. The fan tray contains 12 fans. The fan tray installs vertically on the left front of the chassis and provides side-to-side chassis cooling. See “Cooling System and Airflow in an EX8208 Switch” on page 53.

## Power Supplies

Power supplies for the EX8208 switch are fully redundant, load-sharing, and hot-removable and hot-insertable field-replaceable units (FRUs). Each EX8208 switch chassis can hold up to six 2000 W AC, six 3000 W AC, or six 2000 W DC power supplies.

The 2000 W AC power supplies support both low-voltage line (100–120 VAC) and high-voltage line (200–240 VAC) AC power configurations on an EX8208 switch. Each 2000 W AC power supply delivers 2000 W of power at high-voltage line (200–240 VAC) or 1200 W at low-voltage line (100–120 VAC) to the EX8208 chassis.

Each 3000 W AC power supply delivers 3000 W of power at high-voltage line (200–240 VAC) input to the EX8208 chassis. Low-voltage line input is not supported for the 3000 W AC power supplies on the EX8208 switch.

Each DC power supply delivers 2000 W of power to the chassis when the input voltage is in the range –40 VDC through –72 VDC.

Only two AC power supplies are required for the base AC configuration and switch powerup. The redundant AC configuration ships with six AC power supplies to provide the capacity to power the system using N+1 or N+N power redundancy. See “AC Power Supply in an EX8200 Switch” on page 40 and “EX8208 Switch Configurations” on page 6.

The redundant DC configuration ships with four DC power supplies. The dual inputs of the DC supplies provide direct support for N+N power redundancy. The redundant configuration also provides sufficient capacity for N+1 redundancy in most configurations; if necessary, up to two additional DC supplies can be added to the system. See “DC Power Supply in an EX8200 Switch” on page 48 and “EX8208 Switch Configurations” on page 6.



**CAUTION:** Mixing different types of power supplies in the same chassis is not supported.

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### Related Topics

- Field-Replaceable Units in an EX8208 Switch on page 23
- Connecting and Configuring an EX Series Switch (CLI Procedure) on page 190
- Connecting and Configuring an EX Series Switch (J-Web Procedure) on page 192

## EX8208 Switch Configurations

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Table 1 on page 7 lists the seven sample hardware configurations for an EX8208 switch—base (AC), redundant (AC and DC versions), and fully loaded chassis (AC and DC versions)—and the components included in each configuration.

The switch is shipped in only four of these seven configurations: base (AC with 2000 W AC power supplies), base (AC with 3000 W AC power supplies), redundant (AC with 2000 W AC power supplies), and redundant (DC).

Table 1: EX8208 Switch Hardware Configurations

Switch Configuration	Configuration Components
Base configuration (AC with 2000 W AC power supplies)	<ul style="list-style-type: none"> <li>• Chassis with backplane</li> <li>• One fan tray</li> <li>• One Switch Fabric and Routing Engine (SRE) module</li> <li>• One Switch Fabric (SF) module</li> <li>• Two 2000 W AC power supplies</li> <li>• Two power cords</li> <li>• Eight line card cover panels</li> <li>• Four power supply cover panels</li> </ul>
Base configuration (AC with 3000 W AC power supplies)	<ul style="list-style-type: none"> <li>• Chassis with backplane</li> <li>• One fan tray</li> <li>• One Switch Fabric and Routing Engine (SRE) module</li> <li>• One Switch Fabric (SF) module</li> <li>• Two 3000 W AC power supplies</li> <li>• Two power cords</li> <li>• Eight line card cover panels</li> <li>• Four power supply cover panels</li> </ul>
Redundant configuration (AC with 2000 W AC power supplies)	<ul style="list-style-type: none"> <li>• Chassis with backplane</li> <li>• One fan tray</li> <li>• Two SRE modules</li> <li>• One SF module</li> <li>• Six 2000 W AC power supplies</li> <li>• Six power cords</li> <li>• Eight line card cover panels</li> </ul>
Redundant configuration (DC)	<ul style="list-style-type: none"> <li>• Chassis with backplane</li> <li>• One fan tray</li> <li>• Two SRE modules</li> <li>• One SF module</li> <li>• Four 2000 W DC power supplies</li> <li>• 16 DC power cable lugs</li> <li>• Eight line card cover panels</li> </ul>
Fully loaded chassis configuration (AC with 2000 W AC power supplies)	<ul style="list-style-type: none"> <li>• Chassis with backplane</li> <li>• One fan tray</li> <li>• Two SRE modules</li> <li>• One SF module</li> <li>• Six 2000 W AC power supplies</li> <li>• Six power cords</li> <li>• Eight line cards</li> </ul>

**Table 1: EX8208 Switch Hardware Configurations (continued)**

Switch Configuration	Configuration Components
Fully loaded chassis configuration (AC with 3000 W AC power supplies)	<ul style="list-style-type: none"> <li>• Chassis with backplane</li> <li>• One fan tray</li> <li>• Two SRE modules</li> <li>• One SF module</li> <li>• Six 3000 W AC power supplies</li> <li>• Six power cords</li> <li>• Eight line cards</li> </ul>
Fully loaded chassis configuration (DC)	<ul style="list-style-type: none"> <li>• Chassis with backplane</li> <li>• One fan tray</li> <li>• Two SRE modules</li> <li>• One SF module</li> <li>• Six 2000 W DC power supplies</li> <li>• 24 DC power cable lugs</li> <li>• Eight line cards</li> </ul>



NOTE: You can install up to eight line cards (any combination of line cards) in the switch.



NOTE: Line cards are not part of the base or redundant configuration. You must order them separately.



NOTE: If you want to purchase additional power supplies (AC or DC) for your switch configuration, you must order them separately.

**Related Topics**

- Chassis Physical Specifications of an EX8208 Switch on page 9
- Switch Fabric and Routing Engine (SRE) Module in an EX8208 Switch on page 24
- Switch Fabric (SF) Module in an EX8208 Switch on page 28
- 8-port SFP+ Line Card in an EX8200 Switch on page 30
- 40-port SFP+ Line Card in an EX8200 Switch on page 31
- 48-port SFP Line Card in an EX8200 Switch on page 33
- 48-port RJ-45 Line Card in an EX8200 Switch on page 34
- AC Power Supply in an EX8200 Switch on page 40
- Cooling System and Airflow in an EX8208 Switch on page 53
- Backplane in an EX8208 Switch on page 55

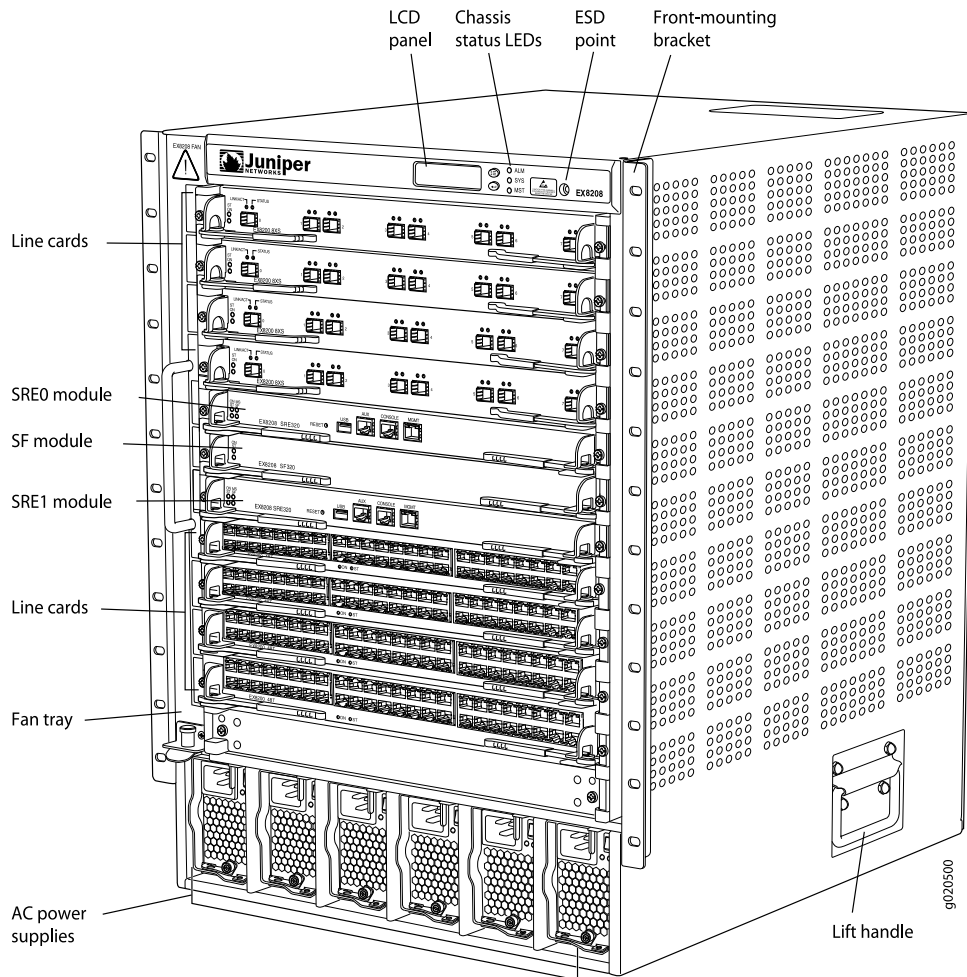
## Chassis Physical Specifications of an EX8208 Switch

The EX8208 switch chassis is a rigid sheet-metal structure that houses the other switch components. Table 2 on page 9 summarizes the physical specifications of the EX8208 switch chassis. See Figure 2 on page 10.

**Table 2: Physical Specifications of the EX8208 Switch Chassis**

Description	Value
Chassis height	24.25 in. (61.6 cm)
Chassis width	<ul style="list-style-type: none"> <li>17.25 in. (43.82 cm)</li> <li>The outer edges of the front-mounting brackets extend the width to 19 in. (48.3 cm).</li> </ul>
Chassis depth	<ul style="list-style-type: none"> <li>20 in. (50.8 cm)</li> <li>The depth from the front-mounting bracket to chassis rear is 20.69 in. (52.6 cm).</li> </ul>
Weight	<ul style="list-style-type: none"> <li>Chassis with backplane: 89 lb (41 kg)</li> <li>Base configuration: 149 lb (68 kg)</li> <li>Redundant configuration: 187 lb (85 kg)</li> <li>Fully loaded chassis: 284 lb (129 kg)</li> </ul> <p>See “EX8208 Switch Configurations” on page 6.</p> <p>NOTE: The fully loaded chassis weight includes the heaviest line cards in all eight slots. If your switch configuration has lighter line cards, the fully loaded chassis weight will be in the 268–284 lb (122–129 kg) range.</p>

Figure 2: EX8208 Switch



You can mount an EX8200 switch on a standard 19-in. four-post rack or a standard 800-mm enclosed cabinet. Up to three EX8208 switches can be installed in a standard (42 rack unit (U)) rack provided the rack can handle their combined weight.

Lift handles are provided on either side of the switch to facilitate the handling of a chassis with only the backplane installed.



**WARNING:** Do not use the lift handles to lift the chassis unless the chassis is empty (that is, contains only the backplane). Failure to heed this warning can result in injury. See “Mounting an EX8208 Switch on a Rack or Cabinet Using a Mechanical Lift” on page 141 or “Mounting an EX8208 Switch on a Rack or Cabinet Without Using a Mechanical Lift” on page 143 for instructions for moving a loaded chassis.

**Related Topics**

- Rack Requirements for an EX8208 Switch on page 97
- Cabinet Requirements and Specifications for an EX8208 Switch on page 100
- Mounting an EX8208 Switch on a Rack or Cabinet on page 138



- Installing and Removing EX8208 Switch Hardware Components on page 149

## Understanding EX8208 Switch Component and Functionality Redundancy

The Juniper Networks EX8208 Ethernet Switch is available as a fully redundant system. A redundant EX8208 switch configuration is designed so that no single point of failure can cause the entire switch to fail. See “EX8208 Switch Configurations” on page 6.

This topic describes:

- Hardware Components That Provide Redundancy on page 11
- Routing Engine and Control Redundancy on page 12
- Switch Fabric Redundancy on page 12

### Hardware Components That Provide Redundancy

The following hardware components provide redundancy to an EX8208 switch:

- SRE modules—An EX8208 switch can have either one Switch Fabric and Routing Engine (SRE) module or two SRE modules. If two SRE modules are installed, one SRE module functions as the master and the other functions as the backup. If the master SRE module fails or is removed the backup module takes over as the master SRE module.

When the SRE modules are configured for graceful switchover, the backup SRE module automatically synchronizes its configuration and state with those of the master SRE module. Any update to the master SRE module is replicated on the backup SRE module. If the backup module assumes mastership, packet forwarding continues through the switch.

- Power supplies—You can install up to six AC or six DC power supplies in an EX8208 switch. Each power supply connects to the backplane of the chassis, which distributes the output power produced by the power supplies to different switch components. (See “Backplane in an EX8208 Switch” on page 55.) Each power supply provides power to all the components in the switch.

An N+1 power configuration is required for Juniper Networks EX8200 Ethernet Switches. In an N+1 power configuration, if one power supply fails or is removed, the remaining power supplies continue to supply power for the entire system without interruption. If dual power feed redundancy is required, the required power configuration is N+N. The DC power supplies provide independent A and B power feeds so that dual power redundancy is available even in an N+1 power configuration. See “AC Power Supply in an EX8200 Switch” on page 40 and “DC Power Supply in an EX8200 Switch” on page 48.

- Cooling system—The cooling system in an EX8200 switch consists of a single fan tray. The fan tray contains 12 fans. Under normal operating conditions, the fans in the fan tray run at less than full speed.

The fans are controlled by two fan tray controllers. The fans are numbered 1 through 12. Fans 1 through 6 are controlled by the first fan tray controller. Fans 7 through 12 are controlled by the second fan tray controller. If one fan tray controller fails, the other

fan tray controller keeps half the fans working. This allows the switch to continue to operate normally as long as the remaining fans cool the chassis sufficiently.

The fan tray continues to operate indefinitely and provides sufficient cooling even when a single fan fails provided the room temperature is within the operating range. See “Cooling System and Airflow in an EX8208 Switch” on page 53.

## Routing Engine and Control Redundancy

Each SRE module contains switch fabric circuitry, Routing Engine circuitry, and switch control and management circuitry. An EX8208 switch can have one SRE module or two SRE modules. If a switch has two SRE modules, one functions as the master while the other functions as a backup and is in standby mode. This provides the switch with full redundancy (1+1) for Routing Engine and switch control functionality.

Table 3 on page 12 shows the available slots in the EX8208 chassis and the Routing Engine and control redundancy associated with different SRE module and Switch Fabric (SF) module combinations.

**Table 3: Routing Engine and Control Redundancy for EX8208 Switches**

Switch Configuration	Slot SRE0	Slot SRE1	Slot SF	Routing Engine and Control Redundancy
Base configuration	SRE module	Empty	SF module	No
Base configuration	Empty	SRE module	SF module	No
User-defined configuration	SRE module	SRE module	Empty	Yes
Redundant configuration	SRE module	SRE module	SF module	Yes

## Switch Fabric Redundancy

The switch fabric circuitry in an EX8208 switch is distributed across three modules—two SRE modules and one SF module. Any two of these three modules must be installed and functional to provide a working switch fabric with no redundancy. The third module, when present, provides partial redundancy (2+1) for the switching functionality, such that if any one of the two functional modules becomes nonoperational, the third module takes over.

Table 4 on page 12 shows the available slots in an EX8208 chassis and the switch fabric redundancy associated with different SRE module and SF module combinations.

**Table 4: Switch Fabric Redundancy for EX8208 Switches**

Switch Configuration	Slot SRE0	Slot SRE1	Slot SF	Switch Fabric Redundancy
Base configuration	SRE module	Empty	SF module	No

Table 4: Switch Fabric Redundancy for EX8208 Switches (*continued*)

Switch Configuration	Slot SRE0	Slot SRE1	Slot SF	Switch Fabric Redundancy
Base configuration	Empty	SRE module	SF module	No
User-defined configuration	SRE module	SRE module	Empty	No
Redundant configuration	SRE module	SRE module	SF module	Yes

- Related Topics**
- Switch Fabric and Routing Engine (SRE) Module in an EX8208 Switch on page 24
  - Switch Fabric (SF) Module in an EX8208 Switch on page 28

## Slot Numbering for an EX8208 Switch

An EX8208 chassis accepts eight line cards, two Switch Fabric and Routing Engine (SRE) modules, one Switch Fabric (SF) module, one fan tray, and six power supplies (AC or DC). All 11 slots for the line cards and the modules run horizontally across the front of the chassis. The fan tray slot runs vertically on the left of the chassis front. The six power supply slots run vertically across the front bottom of the chassis.

This topic describes:

- Slot Numbering for SRE and SF Module Slots and Line Card Slots on page 13
- Slot Numbering for the Power Supply Slots on page 15

### Slot Numbering for SRE and SF Module Slots and Line Card Slots

Table 5 on page 13 lists the slot numbers on the EX8208 chassis and the components those slots accept.

Table 5: Slot Numbering for an EX8208 Switch

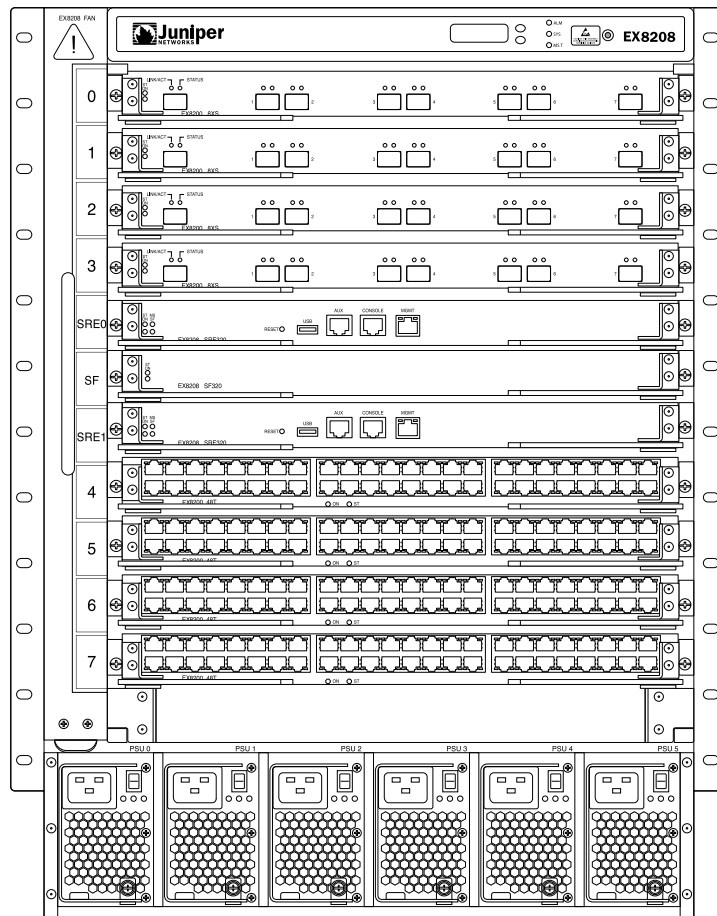
Slot Label	Components Accepted in Slot
0	Line card
1	Line card
2	Line card
3	Line card
SRE0	SRE module
SF	SF module
SRE1	SRE module

Table 5: Slot Numbering for an EX8208 Switch (*continued*)

Slot Label	Components Accepted in Slot
4	Line card
5	Line card
6	Line card
7	Line card

Figure 3 on page 14 shows the slot numbering, which is on the front left of the chassis.

Figure 3: Slot Numbering for an EX8208 Switch



Slots 0 through 7 accept one of the line cards available. See “Installing a Line Card in an EX8200 Switch” on page 160.

Slots SRE0 and SRE1 accept only the SRE module. You can install one SRE module or two SRE modules based on the configuration of your switch. See “Switch Fabric and Routing Engine (SRE) Module in an EX8208 Switch” on page 24.



**NOTE:** We recommend that you install two SRE modules for redundancy. If you install only one SRE module, we recommend that you install it in the slot SRE0. See “Installing an SRE Module in an EX8208 Switch” on page 155.

Slot SF accepts only the SF module. See “Switch Fabric (SF) Module in an EX8208 Switch” on page 28. An EX8208 switch can have either zero SF modules or one SF module based on your switch configuration. The SF module is keyed so that it does not fit in any other slot in the chassis. See “Installing an SF Module in an EX8208 Switch” on page 157.

### Slot Numbering for the Power Supply Slots

The chassis has six vertical slots on its front bottom. You can install up to six power supplies (either all AC or all DC) in these slots, which are labeled PSU 0 through PSU 5 (from left to right). Table 6 on page 15 lists the slot numbers for the power supplies on an EX8208 switch. See “AC Power Supply in an EX8200 Switch” on page 40 and “DC Power Supply in an EX8200 Switch” on page 48.



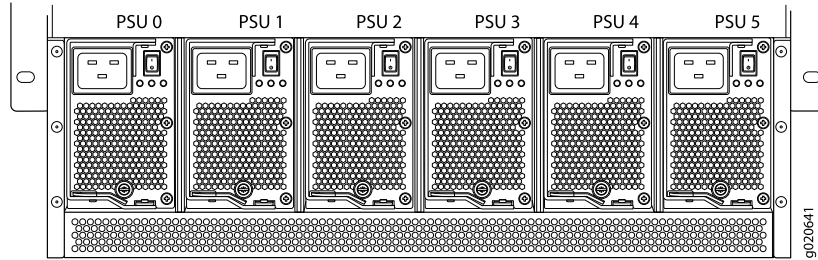
**CAUTION:** Mixing different types of power supplies in the same chassis is not a supported configuration.

**Table 6: Slot Numbering for Power Supply Slots on an EX8208 Switch Chassis Front**

Slot Label	Components Accepted in Slot
PSU 0	Power supply
PSU 1	Power supply
PSU 2	Power supply
PSU 3	Power supply
PSU 4	Power supply
PSU 5	Power supply

Figure 4 on page 16 shows the slot numbering for the power supply slots in an EX8208 switch.

Figure 4: Slot Numbering for Power Supply Slots on an EX8208 Switch Chassis Front



NOTE: Power supplies can be installed in any slot. You do not have to install them in serial order. See “Installing an AC Power Supply in an EX8200 Switch” on page 150 and “Installing a DC Power Supply in an EX8200 Switch” on page 152.

**Related Topics**

- 8-port SFP+ Line Card in an EX8200 Switch on page 30
- 40-port SFP+ Line Card in an EX8200 Switch on page 31
- 48-port SFP Line Card in an EX8200 Switch on page 33
- 48-port RJ-45 Line Card in an EX8200 Switch on page 34
- EX8208 Switch Hardware Overview on page 3

## CHAPTER 2

# Component Descriptions

- LCD Panel in an EX8200 Switch on page 17
- Chassis Status LEDs in an EX8200 Switch on page 22
- Field-Replaceable Units in an EX8208 Switch on page 23
- Switch Fabric and Routing Engine (SRE) Module in an EX8208 Switch on page 24
- SRE Module LEDs in an EX8208 Switch on page 26
- Management Port LEDs in EX8200 Switches on page 27
- Switch Fabric (SF) Module in an EX8208 Switch on page 28
- SF Module LEDs in an EX8208 Switch on page 29
- 8-port SFP+ Line Card in an EX8200 Switch on page 30
- 40-port SFP+ Line Card in an EX8200 Switch on page 31
- 48-port SFP Line Card in an EX8200 Switch on page 33
- 48-port RJ-45 Line Card in an EX8200 Switch on page 34
- Line Card LEDs in an EX8200 Switch on page 35
- Network Port LEDs in an EX8200 Switch on page 37
- AC Power Supply in an EX8200 Switch on page 40
- AC Power Supply LEDs in an EX8200 Switch on page 46
- DC Power Supply in an EX8200 Switch on page 48
- DC Power Supply LEDs in an EX8200 Switch on page 50
- Cooling System and Airflow in an EX8208 Switch on page 53
- Backplane in an EX8208 Switch on page 55

### LCD Panel in an EX8200 Switch

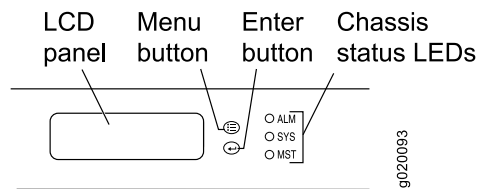
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The LCD panel on the top front of the EX8200 switch chassis shows two lines of text with a maximum of 16 characters in each line. The LCD panel displays a variety of information about the switch and provides menu options to perform basic operations such as initial configuration and switch reboot.

There are two navigation buttons—**Menu** and **Enter**—to the right of the LCD panel.

See Figure 5 on page 18.

Figure 5: LCD Panel in an EX8200 Switch



You can configure the second line of the LCD panel to display a custom message. If the LCD panel is configured to display a custom message, the **Menu** button and the **Enter** button are disabled. See [Configuring the LCD Panel on EX Series Switches \(CLI Procedure\)](#).

The LCD panel has a backlight. If the LCD panel is idle for 60 seconds, the backlight turns off. You can turn on the backlight by pressing the **Menu** or **Enter** button once. After turning on the backlight, you can toggle between the LCD menus by pressing the **Menu** button and navigate through the menu options by pressing the **Enter** button.



**NOTE:** The chassis viewer in the J-Web interface also displays the LCD panel. From the J-Web interface, you can view real-time status information in the LCD panel. See [Dashboard for EX Series Switches](#).

This topic describes:

- LCD Panel Modes on page 18
- LCD Panel Menus on page 19

## LCD Panel Modes

The LCD operates in four modes: boot, idle, status, and maintenance.

The LCD operates in boot mode during switch reboot.

The boot mode displays the key milestones in the switch boot process. The boot mode does not have any menu options. After the boot process is complete, the LCD automatically reverts to the Idle menu.

In the idle mode, line two of the Idle menu displays the network ports' Status LED modes and the total number of alarms in the system. The number of alarms is updated every second.

The status mode allows you to get status information for the following items:

- Switch fabric in Switch Fabric and Routing Engine (SRE) modules in EX8208 switches
- Routing Engine (RE) and switch fabric in Switch Fabric (SF) module(s) in EX8216 switches
- Power supplies
- Fan tray(s) and chassis temperature
- Junos OS version installed



The maintenance mode allows you to cycle through options for configuring and troubleshooting the switch:

- System halt
- Reboot system
- Load rescue configuration
- Revert to factory configuration
- EZSetup

## LCD Panel Menus

The LCD has three menus: Idle, Status, and Maintenance. In each of these menus, line one of the LCD panel displays the hostname of the switch. Toggle between the LCD menus by pressing the **Menu** button. Navigate through the menu options by pressing the **Enter** button.

Table 7 on page 19 describes the LCD menu options.

**Table 7: LCD Panel Menu Options for the EX8200 Switch**

Menu	Description
Idle	<p>In the Idle menu:</p> <ul style="list-style-type: none"> <li>• Press <b>Enter</b> to cycle through the Status LED modes, which are port status indicators: <ul style="list-style-type: none"> <li>• ADM (enabled/disabled)</li> <li>• SPD (speed)</li> <li>• DPX (duplex)</li> </ul> <p>See “Network Port LEDs in an EX8200 Switch” on page 37 for information on the Status LED.</p> </li> <li>• Press <b>Menu</b> to exit the Idle menu and go to the Status menu.</li> </ul>

Table 7: LCD Panel Menu Options for the EX8200 Switch (*continued*)

Menu	Description
Status	<p>The Status menu has the following options:</p> <ul style="list-style-type: none"> <li>• Switch fabric status—Choose one of the following: <ul style="list-style-type: none"> <li>• Press <b>Enter</b> to display the status of the switch fabric in the SRE modules (SRE0 and SRE1) in EX8208 switches and the SF modules (SF) in EX8216 switches: OK, Fld (failed), ABS (absent)</li> <li>• Press <b>Menu</b> to go to the next option in the Status menu.</li> </ul> </li> <li>• Power supply status (1)—Choose one of the following: <ul style="list-style-type: none"> <li>• Press <b>Enter</b> to display the status of power supplies 0 and 1: OK, Fld, ABS.</li> <li>• Press <b>Menu</b> to go to the next option in the Status menu.</li> </ul> </li> <li>• Power supply status (2)—Choose one of the following: <ul style="list-style-type: none"> <li>• Press <b>Enter</b> to display the status of power supplies 2, 3, 4, and 5: OK, Fld, ABS.</li> <li>• Press <b>Menu</b> to go to the next option in the Status menu.</li> </ul> </li> <li>• Environment status—Choose one of the following: <ul style="list-style-type: none"> <li>• Press <b>Enter</b> to display the status of the fan tray(s) and the chassis temperature: <ul style="list-style-type: none"> <li>• Fan tray(s) status: OK, Fld, ABS</li> <li>• Chassis temperature status: OK, High, Shutdown</li> </ul> </li> <li>• Press <b>Menu</b> to go to the next option in the Status menu.</li> </ul> </li> <li>• Junos version status—Choose one of the following: <ul style="list-style-type: none"> <li>• Press <b>Enter</b> to display the version of Junos OS for EX Series switches loaded on the switch.</li> <li>• Press <b>Menu</b> to go to the next option in the Status menu.</li> </ul> </li> <li>• EXIT STAT MENU?—Choose one of the following: <ul style="list-style-type: none"> <li>• Press <b>Enter</b> to exit the Status menu.</li> <li>• Press <b>Menu</b> to return to the Switch fabric status option.</li> </ul> </li> </ul> <p>If you do not want users to use Status menu options, disable the entire menu or individual menu options. See <a href="#">Configuring the LCD Panel on EX Series Switches (CLI Procedure)</a>.</p>

Table 7: LCD Panel Menu Options for the EX8200 Switch (*continued*)

Menu	Description
Maintenance	<p>The Maintenance menu has the following options:</p> <ul style="list-style-type: none"> <li>• SYSTEM HALT?—Choose one of the following: <ul style="list-style-type: none"> <li>• Press <b>Enter</b> to halt the master SRE module in an EX8208 switch or to halt the master RE module in an EX8216 switch. Press <b>Enter</b> again to confirm the halt. In a base configuration switch, the master SRE or RE module will be gracefully halted but not powered off. Press <b>Enter</b> on your management device or power cycle the switch to bring the switch back up. In a redundant configuration, the backup SRE or RE module takes over mastership when the master SRE or RE module is halted. To completely halt the switch, use the <b>request system halt other-routing-engine</b> CLI command to halt the backup SRE or RE module before halting the master SRE or RE module. Press <b>Enter</b> on your management device or power cycle the switch to bring the switch back up. See “EX8208 Switch Configurations” on page 6 or EX8216 Switch Configurations for information on configuration types.</li> <li>• Press <b>Menu</b> to go to the next option in the Maintenance menu.</li> </ul> </li> <li>• SYSTEM REBOOT?—Choose one of the following: <ul style="list-style-type: none"> <li>• Press <b>Enter</b> to reboot the master SRE or RE module. Press <b>Enter</b> again to confirm the reboot.</li> <li>• Press <b>Menu</b> to go to the next option in the Maintenance menu.</li> </ul> </li> <li>• LOAD RESCUE?—Choose one of the following: <ul style="list-style-type: none"> <li>• Press <b>Enter</b> to roll back the switch to the previous valid configuration. Press <b>Enter</b> again to confirm the rollback.</li> <li>• Press <b>Menu</b> to go to the next option in the Maintenance menu.</li> </ul> </li> <li>• FACTORY DEFAULT?—Choose one of the following: <ul style="list-style-type: none"> <li>• Press <b>Enter</b> to restore the switch to the factory default configuration. Press <b>Enter</b> again to confirm the restoration. The LCD flashes a success or failure message and returns to the Idle menu.</li> <li>• Press <b>Menu</b> to go to the next option in the Maintenance menu.</li> </ul> </li> <li>• ENTER EZSETUP?—Choose one of the following: <ul style="list-style-type: none"> <li>• Press <b>Enter</b> to launch EZSetup. Press <b>Enter</b> again to confirm the launch. EZSetup configures DHCP and enables the J-Web user interface on the switch. The LCD flashes a success or failure message for approximately 10 seconds and returns to the Idle menu.</li> <li>• Press <b>Menu</b> to go to the next option in the Maintenance menu.</li> </ul> </li> </ul> <p>NOTE: You can use the EZSetup option only if the switch is in the factory default configuration.</p> <ul style="list-style-type: none"> <li>• EXIT MAINT MENU?—Choose one of the following: <ul style="list-style-type: none"> <li>• Press <b>Enter</b> to exit the Maintenance menu.</li> <li>• Press <b>Menu</b> to return to the SYSTEM HALT option.</li> </ul> </li> </ul> <p>If you do not want users to use Maintenance menu options, disable the entire menu or individual menu options. See Configuring the LCD Panel on EX Series Switches (CLI Procedure).</p>

You can view the information about the LCD panel in EX8200 switches by executing the command **show chassis hardware**. It shows the version, part number, serial number, and description of the LCD panel.

- Related Topics**
- Chassis Status LEDs in an EX8200 Switch on page 22
  - Field-Replaceable Units in an EX8208 Switch on page 23
  - Field-Replaceable Units in an EX8216 Switch

- Connecting and Configuring an EX Series Switch (CLI Procedure) on page 190
- Connecting and Configuring an EX Series Switch (J-Web Procedure) on page 192

## Chassis Status LEDs in an EX8200 Switch

The top front of the chassis of an EX8200 switch has three LEDs on the right side of the LCD panel.

See Figure 6 on page 22.

**Figure 6: Chassis Status LEDs**

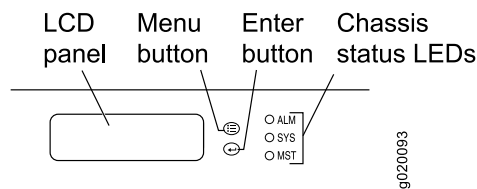


Table 8 on page 22 describes the chassis status LEDs in an EX8200 switch, their colors and states, and the status they indicate. You can view the colors of the three LEDs remotely through the CLI by issuing the operational mode command **show chassis lcd**.

**Table 8: Chassis Status LEDs in an EX8200 Switch**

LED Label (Description)	Color	State and Description
ALM (Alarm)	Unlit	No alarm.
	Red	Major alarm.
	Yellow	Minor alarm.
SYS (System)	Unlit	Switch is powered off.
	Yellow	One or more component failures are generating one or more alarms.
	Green	Switch is operating normally.
MST (Master)	Unlit	Switch is powered off.
	Green	Master Routing Engine is operational.

A major alarm (red) indicates a critical error condition that requires immediate action.

A minor alarm (yellow) indicates a noncritical condition that requires monitoring or maintenance. A minor alarm that is left unchecked might cause interruption in service or performance degradation.

All three LEDs can be lit simultaneously.

- Related Topics**
- LCD Panel in an EX8200 Switch on page 17
  - Understanding Alarm Types and Severity Levels on EX Series Switches

## Field-Replaceable Units in an EX8208 Switch

Field-replaceable units (FRUs) are switch components that you can replace at your site. The switch uses these types of FRUs:

- Hot-insertable and hot-removable—You can remove and replace these components without powering off the switch or disrupting the switching function.
- Hot-pluggable—You can remove and replace these components without powering off the switch, but the switching function is interrupted until you replace the component.

Table 9 on page 23 lists the FRUs for the EX8208 switch and their types.

**Table 9: FRUs in an EX8208 Switch**

FRU	Type
Power supplies	Hot-insertable and hot-removable.
Fan tray	Hot-insertable and hot-removable.
Switch Fabric and Routing Engine (SRE) module	<p>Redundant configuration:</p> <ul style="list-style-type: none"> <li>• Master SRE module is hot-pluggable.</li> <li>• Backup SRE module is hot-insertable and hot-removable.</li> </ul> <p>Base configuration:</p> <ul style="list-style-type: none"> <li>• Switch must be disabled before the SRE module is removed. See “Taking the SRE Module Offline in an EX8208 Switch” on page 213.</li> </ul> <p>See “EX8208 Switch Configurations” on page 6.</p>
Switch Fabric (SF) module	<p>Redundant configuration:</p> <ul style="list-style-type: none"> <li>• SF module is hot-insertable and hot-removable.</li> </ul> <p>Base configuration:</p> <ul style="list-style-type: none"> <li>• We recommend that you disable the switch before removing the SF module. See “Taking the SF Module Offline in an EX8208 Switch” on page 216.</li> </ul> <p>See “EX8208 Switch Configurations” on page 6.</p>
8-port SFP+ line card	Hot-insertable and hot-removable.
40-port SFP+ line card	We recommend that you take the line cards offline before removing them. See “Removing a Line Card from an EX8200 Switch” on page 218.
48-port SFP line card	
48-port RJ-45 line card	
SFP and SFP+ transceivers	Hot-insertable and hot-removable.



NOTE: Line cards are not part of the base or redundant configuration. You must order them separately.



NOTE: If you have a Juniper J-Care service contract, register any addition, change, or upgrade of hardware components at <https://www.juniper.net/customers/csc/management/updateinstallbase.jsp>. Failure to do so can result in significant delays if you need replacement parts. This note applies if you add a new type of line card. It does not apply if you replace these components with the same type of component.

#### Related Topics

- Installing and Removing EX8208 Switch Hardware Components on page 149
- Removing an SRE Module from an EX8208 Switch on page 215
- Removing an SF Module from an EX8208 Switch on page 217
- Removing a Line Card from an EX8200 Switch on page 218
- Removing an AC Power Supply from an EX8200 Switch on page 207
- Removing a Fan Tray from an EX8208 Switch on page 211
- Removing a Transceiver from an EX Series Switch on page 222

## Switch Fabric and Routing Engine (SRE) Module in an EX8208 Switch

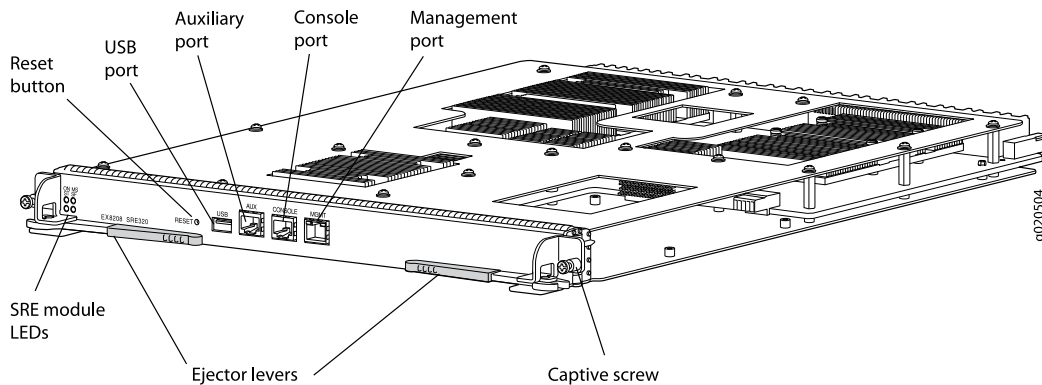
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The Switch Fabric and Routing Engine (SRE) module performs switching and system management functions in an EX8208 switch. See Figure 7 on page 25.

You can install one or two SRE modules in an EX8208 switch. A base configuration EX8208 switch has only one SRE module. See “EX8208 Switch Configurations” on page 6. You can add a second SRE module to the configuration for Routing Engine and switch control redundancy. See “Understanding EX8208 Switch Component and Functionality Redundancy” on page 11.

The SRE modules install horizontally into the front of the chassis in slots labeled SRE0 and SRE1.

Figure 7: SRE Module in an EX8208 Switch



**NOTE:** We recommend that you install two SRE modules for redundancy. If you install only one SRE module, we recommend that you install it in slot SRE0. See “Slot Numbering for an EX8208 Switch” on page 13.

If two SRE modules are installed, one functions as the master and the other acts as the backup. If the master SRE module fails or is removed, the backup takes over as the master.

If two SRE modules are installed, the backup SRE module is hot-insertable and hot-removable, but the master SRE module is hot-pluggable. If only one SRE module is installed, you must halt the SRE module before removing it.

The SRE module provides these functions:

- Provides full fabric connectivity to all line cards installed in the chassis
- Through the switching plane, provides switching functionality to the switch
- Powers the line cards on and off
- Controls system resets and boot sequence for the switch
- Monitors and controls the fan speed, power status for various chassis components, LCD panel and chassis status LEDs

The SRE module has these components:

- SRE module LEDs—Indicate system status. See “SRE Module LEDs in an EX8208 Switch” on page 26.
- Recessed reset button—Power cycles the SRE module when pressed.

Take the SRE module offline using the CLI before pressing the reset button. See “Taking the SRE Module Offline in an EX8208 Switch” on page 213.

- USB port—Provides an interface through which you can install the Junos OS manually. See “USB Port Specifications for an EX Series Switch” on page 57.
- Auxiliary port—This port is not enabled on the EX8200 switch. It is reserved for future use.

- Console port—Connects the SRE module to a system console through a cable with an RJ-45 connector. See “Connecting an EX Series Switch to a Management Console” on page 181.
- Management port—Connects the SRE module through an Ethernet connection to a management LAN (or any other device that plugs into an Ethernet connection) for out-of-band management. See “Connecting an EX Series Switch to a Network for Out-of-Band Management” on page 187.
- Ejector levers—Used for installing and removing the SRE module.
- Captive screws—Secure the SRE module in place.

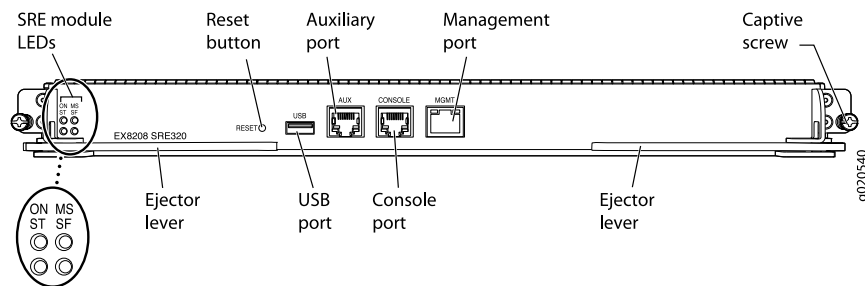
**Related Topics**

- Installing an SRE Module in an EX8208 Switch on page 155
- Removing an SRE Module from an EX8208 Switch on page 215
- Taking the SRE Module Offline in an EX8208 Switch on page 213

### SRE Module LEDs in an EX8208 Switch

Each Switch Fabric and Routing Engine (SRE) module has four LEDs on the left side of the module's front panel. See Figure 8 on page 26. Table 10 on page 26 describes these LEDs, their colors and states, and the status they indicate.

**Figure 8: SRE Module LEDs in an EX8208 Switch**



**Table 10: SRE Module LEDs of an EX8208 Switch**

LED Label (Description)	Color	State and Description
ON (Power On)	Green	SRE module is powered on.
	Unlit	SRE module is powered off.
ST (Status)	Green	<ul style="list-style-type: none"> <li>• On steadily—SRE module is operating normally.</li> <li>• Blinking—SRE module is booting.</li> </ul>
	Yellow	<ul style="list-style-type: none"> <li>• On steadily—SRE module has failed.</li> </ul>
	Unlit	SRE module is offline.



Table 10: SRE Module LEDs of an EX8208 Switch (*continued*)

LED Label (Description)	Color	State and Description
MS (Master)	Green	<ul style="list-style-type: none"> <li>On steadily—SRE module is the master.</li> <li>Blinking—SRE module is in standby mode.</li> </ul>
	Unlit	SRE module is powered off.
SF (Switch Fabric)	Green	<ul style="list-style-type: none"> <li>On steadily—Switch fabric in the SRE module is operating normally.</li> <li>Blinking—Switch fabric in the SRE module is in standby mode.</li> </ul>
	Yellow	Switch fabric in the SRE module has failed.
	Unlit	SRE module is powered off.

- Related Topics**
- Switch Fabric and Routing Engine (SRE) Module in an EX8208 Switch on page 24
  - Installing an SRE Module in an EX8208 Switch on page 155
  - Removing an SRE Module from an EX8208 Switch on page 215
  - Taking the SRE Module Offline in an EX8208 Switch on page 213

## Management Port LEDs in EX8200 Switches

The management port on EX8200 switches has two LEDs that indicate link/activity and port status (see Figure 9 on page 27). The management port is set to full-duplex and the speed is set to 100 Mbps.

Figure 9: LEDs on the Management Port on an EX8200 Switch

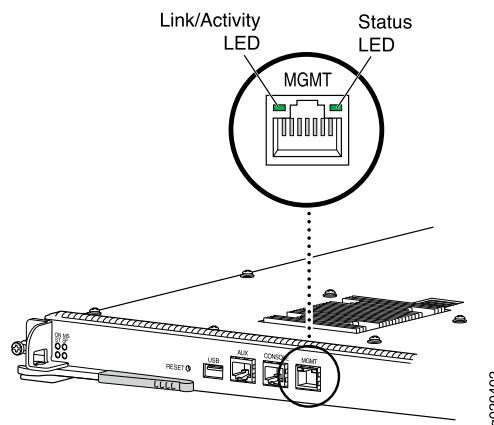


Table 11 on page 28 describes the Link/Activity LED.

Table 11: Link/Activity LED on the Management Port on EX8200 Switches

LED	Color	State and Description
Link/Activity	Green	<ul style="list-style-type: none"> <li>Blinking—The port and the link are active, and there is link activity.</li> <li>On steadily—The port and the link are active, but there is no link activity.</li> <li>Off—The port is not active.</li> </ul>

Table 12 on page 28 describes the Status LED (administrative status).

Table 12: Status LED on the Management Port on EX8200 Switches

LED	Color	State and Description
Status	Green	<ul style="list-style-type: none"> <li>On steadily—Administrative status is enabled.</li> <li>Off—Administrative status is disabled.</li> </ul>

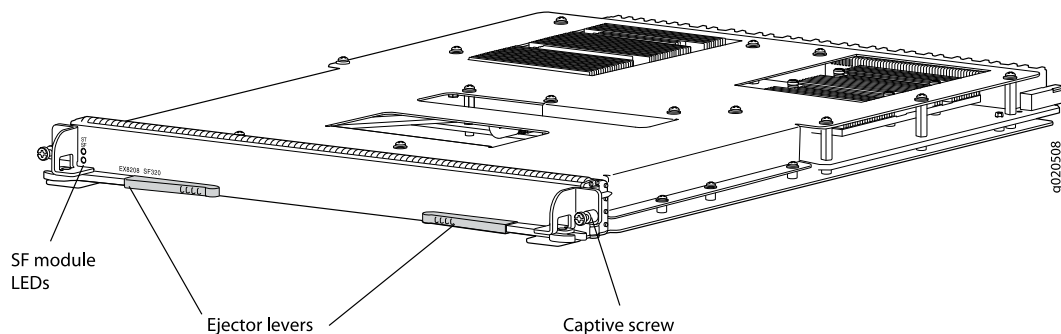
- Related Topics**
- See Switch Fabric and Routing Engine (SRE) Module in an EX8208 Switch on page 24 for port location.
  - See Routing Engine (RE) Module in an EX8216 Switch for port location.
  - Connecting an EX Series Switch to a Network for Out-of-Band Management on page 187

## Switch Fabric (SF) Module in an EX8208 Switch

The Switch Fabric (SF) module provides switching functionality. See Figure 10 on page 28.

An EX8208 switch can have either zero SF modules or one SF module. The base configuration of an EX8208 switch includes one SF module. See “EX8208 Switch Configurations” on page 6.

Figure 10: SF Module in an EX8208 Switch



The SF module can be installed only in the slot labeled SF. The SF module is keyed so that it does not fit in the other slots in the chassis. See “Slot Numbering for an EX8208 Switch” on page 13.

In the base configuration, an SF module is used with a single Switch Fabric and Routing Engine (SRE) module to build a nonredundant system that provides full bandwidth. However, a base configuration EX8208 switch has no Routing Engine and switch control redundancy or switch fabric redundancy. In a base configuration, the main function of the SF module is to switch data between line cards. See “Understanding EX8208 Switch Component and Functionality Redundancy” on page 11.

In a redundant configuration, an SF module is used with two SRE modules to achieve full bandwidth along with Routing Engine and switch control redundancy and switch fabric redundancy. In a redundant configuration, the main function of the SF module is to provide a redundant switching plane for the switch. See “Understanding EX8208 Switch Component and Functionality Redundancy” on page 11.

In a redundant configuration, the SF module is hot-pluggable. However, in the base configuration, you must take the SF module offline before removing it.

The SF module contains logic that determines which SRE module is the master. The master SRE module controls many internal functions of the SF module.

The SF module provides these functions:

- Provide redundant data path connectivity for the switch in the redundant configuration
- Provide nonredundant data path connectivity for the switch in the base configuration

The SF module has these components:

- SF module LEDs—Indicate system status. See “SF Module LEDs in an EX8208 Switch” on page 29.
- Ejector levers—Used for installing and removing the SF module.
- Captive screws—Secure the SF module in place.

- Related Topics**
- Installing an SF Module in an EX8208 Switch on page 157
  - Removing an SF Module from an EX8208 Switch on page 217
  - Taking the SF Module Offline in an EX8208 Switch on page 216

## SF Module LEDs in an EX8208 Switch

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The Switch Fabric (SF) module has two LEDs on the left side of the module’s front panel. See Figure 11 on page 30. Table 13 on page 30 describes these LEDs, their colors and states, and the status they indicate.

Figure 11: SF Module LEDs in an EX8208 Switch

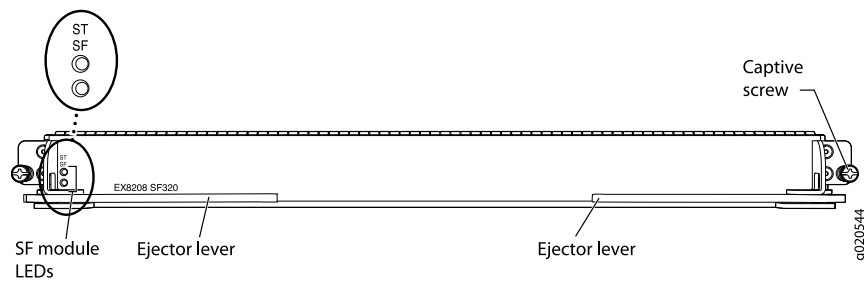


Table 13: SF Module LEDs of an EX8208 Switch

LED (Description)	Color	State and Description
ST (Status)	Green	<ul style="list-style-type: none"> <li>On steadily—SF module is operating normally.</li> <li>Blinking—Waiting to be configured by the master Switch Fabric and Routing Engine (SRE) module.</li> </ul>
	Yellow	SF module has failed.
	Unlit	SF module is offline.
SF (Switch Fabric)	Green	<ul style="list-style-type: none"> <li>On steadily—Switch fabric in SF module is operating normally.</li> <li>Blinking—Switch fabric in SF module is offline.</li> </ul>
	Yellow	On steadily—Switch fabric in SF module has failed.
	Unlit	SF module is powered off.

- Related Topics**
- Installing an SF Module in an EX8208 Switch on page 157
  - Removing an SF Module from an EX8208 Switch on page 217
  - Taking the SF Module Offline in an EX8208 Switch on page 216

## 8-port SFP+ Line Card in an EX8200 Switch

The line cards in EX8200 switches combine a Packet Forwarding Engine and Ethernet interfaces on a single assembly. They are field-replaceable units (FRUs) that can be installed in the line card slots on the front of the switch chassis. The line cards are hot-insertable and hot-removable: You can remove and replace them without powering off the switch or disrupting switch functions.

EX8200 switches use four types of line cards:

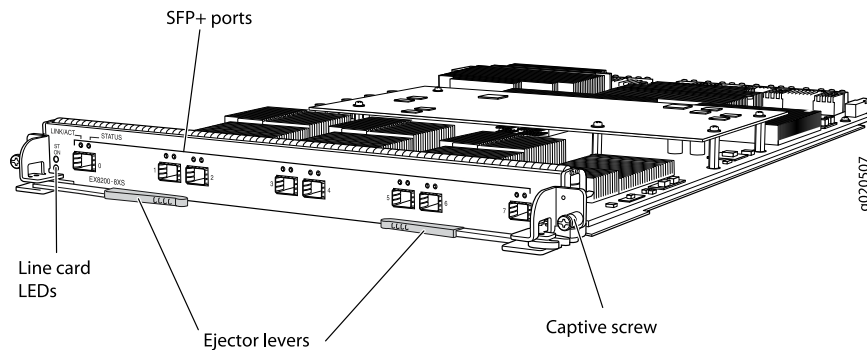
- 8-port SFP+ line card
- 40-port SFP+ line card

- 48-port SFP line card
- 48-port RJ-45 line card

You can use any combination of line cards in an EX8200 switch.

The 8-port SFP+ line card for EX8200 switches (see Figure 12 on page 31) has eight 10-gigabit SFP+ ports on the faceplate in which you can install SFP+ transceivers. The line card is shipped with dust covers preinstalled in the ports. Each port has two LEDs. See “Network Port LEDs in an EX8200 Switch” on page 37.

**Figure 12: 8-port SFP+ Line Card**



The line card has two status LEDs labeled ON and ST on the faceplate that indicate the online and status information for the line card. See “Line Card LEDs in an EX8200 Switch” on page 35.

- Related Topics**
- 40-port SFP+ Line Card in an EX8200 Switch on page 31
  - 48-port SFP Line Card in an EX8200 Switch on page 33
  - 48-port RJ-45 Line Card in an EX8200 Switch on page 34
  - Optical Interface Support in EX8200 Switches on page 60
  - SFP+ Direct Attach Cables for EX Series Switches on page 83
  - Installing a Line Card in an EX8200 Switch on page 160
  - Handling and Storing Line Cards in EX8200 Switches on page 227

## 40-port SFP+ Line Card in an EX8200 Switch

The line cards in EX8200 switches combine a Packet Forwarding Engine and Ethernet interfaces on a single assembly. They are field-replaceable units (FRUs) that can be installed in the line card slots on the front of the switch chassis. The line cards are hot-insertable and hot-removable: You can remove and replace them without powering off the switch or disrupting switch functions.

EX8200 switches use four types of line cards:

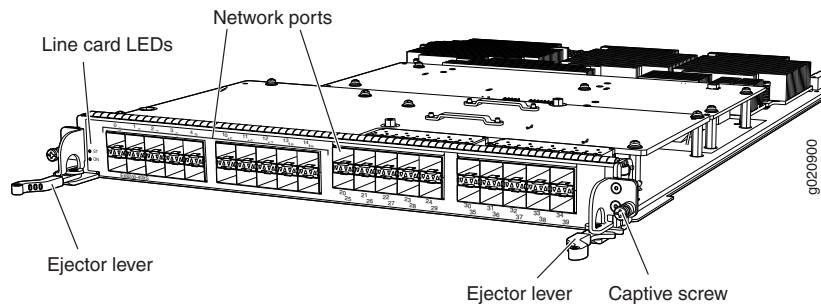
- 8-port SFP+ line card
- 40-port SFP+ line card

- 48-port SFP line card
- 48-port RJ-45 line card

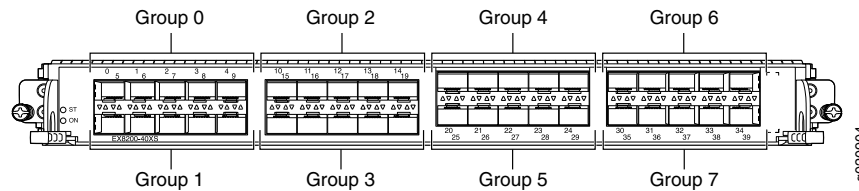
You can use any combination of line cards in an EX8200 switch.

The 40-port SFP+ line card for EX8200 switches (see Figure 13 on page 32) has 40 oversubscribed 10-gigabit SFP+ ports on the faceplate in which you can install either SFP+ or SFP transceivers. Each port has two LEDs. See “Network Port LEDs in an EX8200 Switch” on page 37. The ports are numbered sequentially (see Figure 14 on page 32). The ports are divided into eight groups, each group comprising five ports (see Figure 14 on page 32). The ports in each port group share 10 gigabits of bandwidth.

**Figure 13: 40-port SFP+ Line Card**



**Figure 14: Port Numbering and Port Groups on a 40-port SFP+ Line Card**



The port groups can have different oversubscription ratios depending on the number of active ports in each port group. If only one port in a port group is active, the oversubscription ratio is 1:1. If two ports are active, the ratio is 2:1; if all ports are active, the ratio is 5:1.

If you transmit 10 gigabits of traffic through a port group, the line card does not drop packets. However, if you transmit more than 10 gigabits of traffic through a port group, the line card allows only a fair share of traffic to transit. For example, if you transmit 10 gigabits of traffic though each of the five ports in a port group, the line card allows only a fifth of the traffic from each port to transit. If you transmit 10 gigabits of traffic though two ports in a port group, the line card allows only half the traffic from each port to transit.

Because the port groups share bandwidth, class-of-service (CoS) ingress and egress queues are handled differently on the 40-port SFP+ line card than on other line cards for EX8200 switches (see Understanding CoS Queues on the 40-port SFP+ Line Card on EX8200 Switches). As a result, the ports in a port group must use the same scheduler map. By default, they use the default scheduler map. To configure a different scheduler map on the ports in a port group, see Defining CoS Schedulers (CLI Procedure).

The line card has two status LEDs labeled ON and ST on the faceplate that indicate the online and status information for the line card. See “Line Card LEDs in an EX8200 Switch” on page 35.

The 40-port SFP+ line card requires Junos OS for EX Series switches, Release 10.3 or later.

The line card is shipped with 40 dust covers (in an accessory bag).

- Related Topics**
- 8-port SFP+ Line Card in an EX8200 Switch on page 30
  - 48-port SFP Line Card in an EX8200 Switch on page 33
  - 48-port RJ-45 Line Card in an EX8200 Switch on page 34
  - Optical Interface Support in EX8200 Switches on page 60
  - SFP+ Direct Attach Cables for EX Series Switches on page 83
  - Troubleshooting CoS Schedulers on a 40-port SFP+ Line Card in an EX8200 Switch

## 48-port SFP Line Card in an EX8200 Switch

The line cards in EX8200 switches combine a Packet Forwarding Engine and Ethernet interfaces on a single assembly. They are field-replaceable units (FRUs) that can be installed in the line card slots on the front of the switch chassis. The line cards are hot-insertable and hot-removable: You can remove and replace them without powering off the switch or disrupting switch functions.

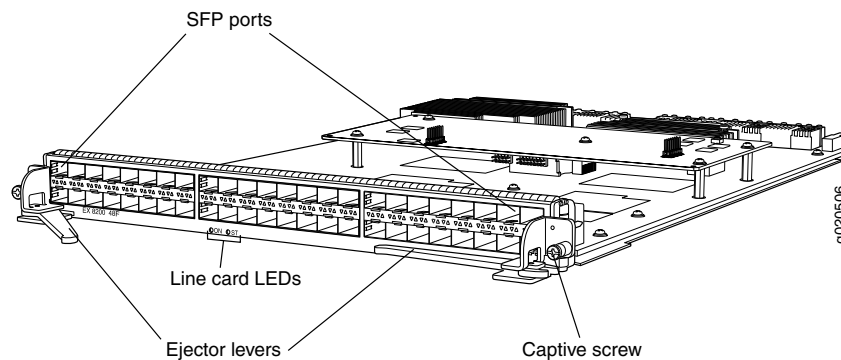
EX8200 switches use four types of line cards:

- 8-port SFP+ line card
- 40-port SFP+ line card
- 48-port SFP line card
- 48-port RJ-45 line card

You can use any combination of line cards in an EX8200 switch.

The 48-port SFP line card for EX8200 switches (see Figure 15 on page 34) has 48 1-gigabit SFP ports on the faceplate in which you can install SFP transceivers. The line card is shipped with 48 dust covers (in the accessory bag). Each port has two LEDs. See “Network Port LEDs in an EX8200 Switch” on page 37.

Figure 15: 48-port SFP Line Card



The line card has two status LEDs labeled ON and ST on the faceplate that indicate the online and status information for the line card. See “Line Card LEDs in an EX8200 Switch” on page 35.

- Related Topics**
- 8-port SFP+ Line Card in an EX8200 Switch on page 30
  - 40-port SFP+ Line Card in an EX8200 Switch on page 31
  - 48-port RJ-45 Line Card in an EX8200 Switch on page 34
  - Optical Interface Support in EX8200 Switches on page 60
  - Installing a Line Card in an EX8200 Switch on page 160
  - Handling and Storing Line Cards in EX8200 Switches on page 227

## 48-port RJ-45 Line Card in an EX8200 Switch

The line cards in EX8200 switches combine a Packet Forwarding Engine and Ethernet interfaces on a single assembly. They are field-replaceable units (FRUs) that can be installed in the line card slots on the front of the switch chassis. The line cards are hot-insertable and hot-removable: You can remove and replace them without powering off the switch or disrupting switch functions.

EX8200 switches use four types of line cards:

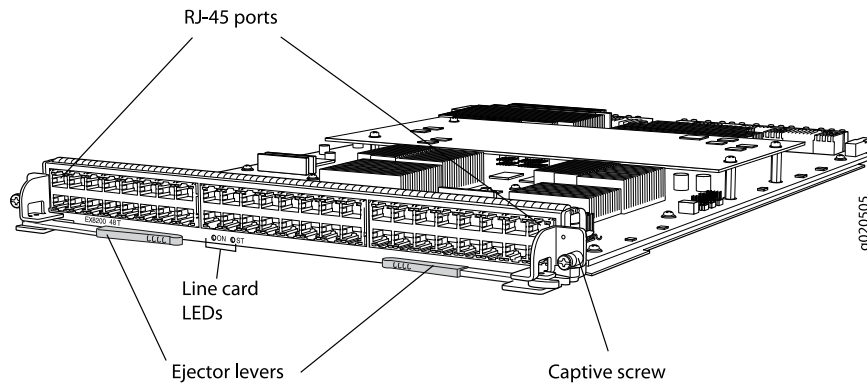
- 8-port SFP+ line card
- 40-port SFP+ line card
- 48-port SFP line card
- 48-port RJ-45 line card

You can use any combination of line cards in an EX8200 switch.

The 48-port RJ-45 line card for EX8200 switches (see Figure 16 on page 35) has 48 10/100/1000 Gigabit Ethernet ports with RJ-45 connectors on the faceplate. Each port has two LEDs. See “Network Port LEDs in an EX8200 Switch” on page 37.



Figure 16: 48-port RJ-45 Line Card



The line card has two status LEDs labeled ON and ST on the faceplate that indicate the online and status information for the line card. See “Line Card LEDs in an EX8200 Switch” on page 35.

- Related Topics**
- 8-port SFP+ Line Card in an EX8200 Switch on page 30
  - 40-port SFP+ Line Card in an EX8200 Switch on page 31
  - 48-port SFP Line Card in an EX8200 Switch on page 33
  - Installing a Line Card in an EX8200 Switch on page 160
  - Handling and Storing Line Cards in EX8200 Switches on page 227

## Line Card LEDs in an EX8200 Switch

The line cards in EX8200 switches have two status LEDs labeled ON and ST on the faceplate (see Figure 17 on page 35, Figure 18 on page 36, Figure 19 on page 36, and Figure 20 on page 36) that indicate the online and status information of the line cards.

Figure 17: Status LEDs on an 8-port SFP+ Line Card

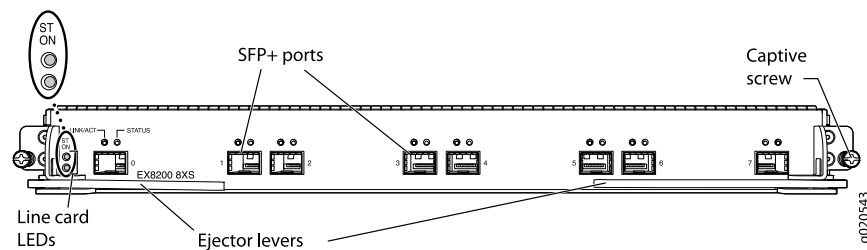


Figure 18: Status LEDs on a 40-port SFP+ Line Card

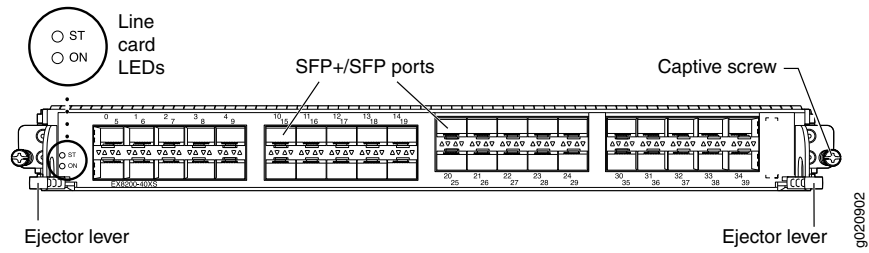


Figure 19: Status LEDs on a 48-port SFP Line Card

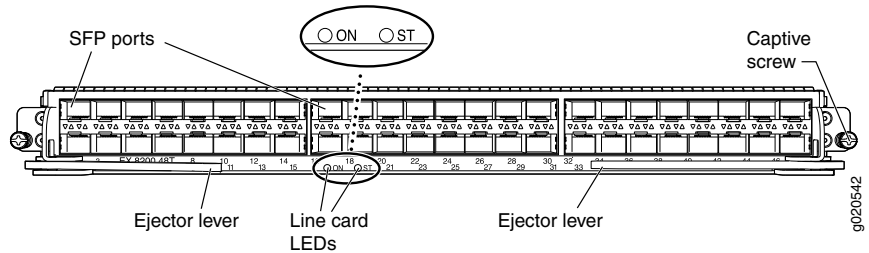


Figure 20: Status LEDs on a 48-port RJ-45 Line Card

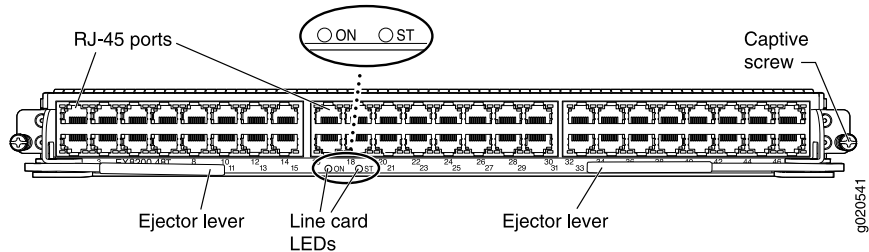


Table 14 on page 36 describes the status LEDs on line cards for the EX8200 switch, their colors and state, and the status they indicate.

Table 14: Status LEDs on Line Cards for EX8200 Switches

LED	Color	State and Description
ON	Green	The line card is enabled/online.
	Yellow	The line card is disabled/offline.
	Unlit	There is no power being supplied to the line card.
ST	Green	<ul style="list-style-type: none"> <li>On steadily—The line card is functioning normally.</li> <li>Blinking—The line card is booting.</li> </ul>
	Yellow	<ul style="list-style-type: none"> <li>On steadily—There is a line card failure or alarm.</li> <li>Blinking—The line card is in diagnostic mode.</li> </ul>
	Unlit	The line card is disabled/offline.

- Related Topics**
- 8-port SFP+ Line Card in an EX8200 Switch on page 30
  - 40-port SFP+ Line Card in an EX8200 Switch on page 31
  - 48-port SFP Line Card in an EX8200 Switch on page 33
  - 48-port RJ-45 Line Card in an EX8200 Switch on page 34
  - Network Port LEDs in an EX8200 Switch on page 37

## Network Port LEDs in an EX8200 Switch

Each network port on the faceplate of a line card in an EX8200 switch has two LEDs.

Figure 21 on page 37 shows the network port LEDs on an 8-port SFP+ line card.

**Figure 21: Network Port LEDs on an 8-port SFP+ Line Card**

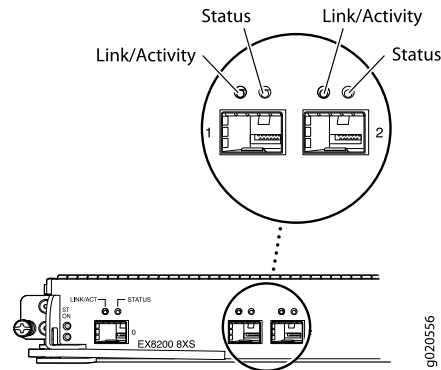


Figure 22 on page 37 shows the network port LEDs on a 40-port SFP+ line card. The LEDs point toward the port to which the LEDs belong.

**Figure 22: Network Port LEDs on a 40-port SFP+ Line Card**

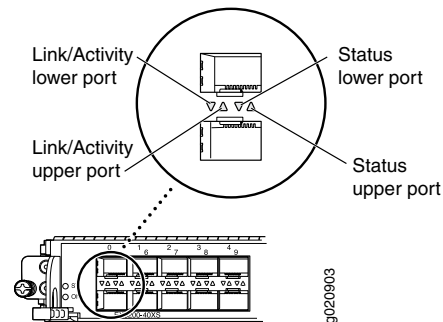


Figure 23 on page 38 shows the network port LEDs on a 48-port SFP line card. The LEDs point toward the port to which the LEDs belong.

Figure 23: Network Port LEDs on a 48-port SFP Line Card

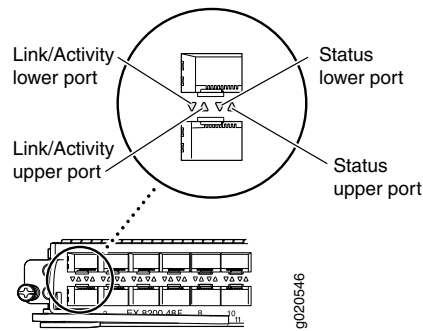
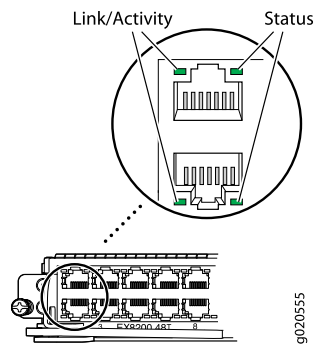


Figure 24 on page 38 shows the network port LEDs on a 48-port RJ-45 line card.

Figure 24: Network Port LEDs on a 48-port RJ-45 Line Card



The LEDs labeled Link/Activity in Figure 21 on page 37, Figure 22 on page 37, Figure 23 on page 38, and Figure 24 on page 38 indicate link activity.

Table 15 on page 38 describes the Link/Activity LED.

Table 15: Network Port LEDs on Line Cards in an EX8200 Switch—Link/Activity LED

LED	Color	State and Description
Link/Activity	Green	<ul style="list-style-type: none"> <li>On steadily—The port and the link are active, but there is no link activity.</li> <li>Blinking—The port and the link are active, and there is link activity.</li> <li>Off—The port is not active.</li> </ul>

The LEDs labeled Status in Figure 21 on page 37, Figure 22 on page 37, Figure 23 on page 38, and Figure 24 on page 38 indicate the status of one of the three port parameters. The port parameters are administrative status, duplex mode, and speed.

Table 16 on page 39 describes the Status LED. From the Idle menu of the LCD, use the **Enter** button on the LCD panel to toggle between the ADM, DPX, and SPD indicators.

Table 16: Network Port LEDs on Line Cards in an EX8200 Switch—Status LED

LED	LCD Indicator	State, Color, and Description
Status	LED: ADM	Indicates the administrative status (enabled or disabled). The status indicators are: <ul style="list-style-type: none"> <li>• Green—Administrative status enabled.</li> <li>• Unlit—Administrative status disabled.</li> </ul>
	LED: DPX	Indicates the duplex mode. The status indicators are: <ul style="list-style-type: none"> <li>• Green—Port is set to full-duplex mode.</li> <li>• Unlit—Port is not set to full-duplex mode.</li> </ul>
	LED: SPD	Indicates the speed. The speed indicators are different in the line cards. <p>The speed indicators for 8-port SFP+ line cards are:</p> <ul style="list-style-type: none"> <li>• Unlit—Less than 10 Gbps</li> <li>• Green—10 Gbps</li> </ul> <p>The speed indicators for 40-port SFP+ line cards are:</p> <ul style="list-style-type: none"> <li>• Unlit—Less than 10 Gbps</li> <li>• Green—10 Gbps</li> </ul> <p>The speed indicators for 48-port SFP line cards are:</p> <ul style="list-style-type: none"> <li>• Unlit—Less than 1 Gbps</li> <li>• Green—1 Gbps</li> </ul> <p>The speed indicators for 48-port RJ-45 line cards are:</p> <ul style="list-style-type: none"> <li>• Unlit—10 Mbps</li> <li>• Green—Blinking—100 Mbps</li> <li>• Green—On steadily—1000 Mbps</li> </ul>

- Related Topics**
- 8-port SFP+ Line Card in an EX8200 Switch on page 30
  - 40-port SFP+ Line Card in an EX8200 Switch on page 31
  - 48-port SFP Line Card in an EX8200 Switch on page 33
  - 48-port RJ-45 Line Card in an EX8200 Switch on page 34
  - Line Card LEDs in an EX8200 Switch on page 35
  - LCD Panel in an EX8200 Switch on page 17

## AC Power Supply in an EX8200 Switch

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EX8200 switches can use either AC or DC power supplies. This topic describes the AC power supplies in EX8200 switches:

- AC Power Supply Description on page 40
- N+1 Redundancy Configuration of AC Power Supplies on page 42
- N+N Redundancy Configuration of AC Power Supplies on page 43

### AC Power Supply Description

The AC power supplies in EX8200 switches are hot-insertable and hot-removable field-replaceable units (FRUs).

You can install up to six AC power supplies in an EX8200 switch. Power supplies are installed at the bottom of the chassis in slots PSU 0 through PSU 5 (left to right). All power supplies are accessible from the front of the chassis.



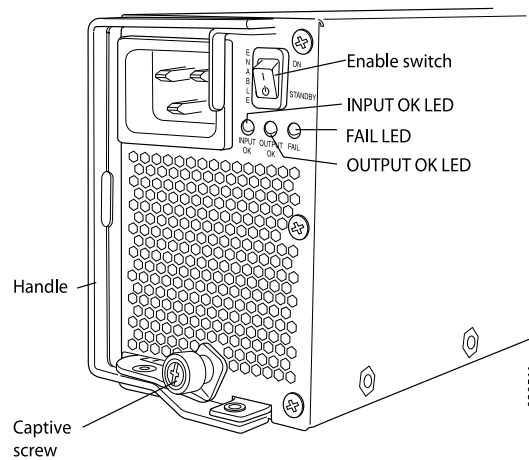
**WARNING:** The switch is pluggable type A equipment installed in a restricted-access location. It has a separate protective earthing terminal provided on the chassis in addition to the grounding pin of the power supply cord. This separate protective earthing terminal must be permanently connected to earth ground.



**NOTE:** All base configuration EX8200 switches are shipped with two power supplies. Cover panels are installed over the remaining four power supply slots. Additional power supplies can be added to base configuration switches as necessary. For details about different switch configurations, see “EX8208 Switch Configurations” on page 6 or EX8216 Switch Configurations.

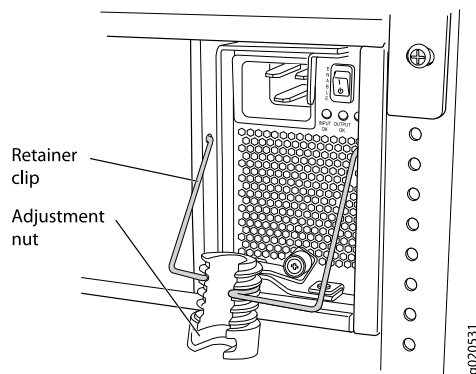
Each AC power supply weighs approximately 7 lb (3.2 kg) and has an independent 16 A rated AC inlet on its front. Each inlet requires a dedicated AC power feed. Each AC power supply has an **Enable** switch, a fan, and three LEDs on the faceplate that indicate the status of the power supply. See Figure 25 on page 41.

Figure 25: AC Power Supply



Each AC power supply comes with a power retainer that holds the power cord in place. See Figure 26 on page 41. The power retainer has a clip and an adjustment nut. The L-shaped ends of the clip hook into the bracket holes on each side of the AC appliance inlet on the faceplate. The adjustment nut holds the power cord in the correct position. For instructions for installing the power retainer, see “Connecting AC Power to an EX8200 Switch” on page 173.

Figure 26: Power Retainer for an AC Power Supply



Each power supply connects to the backplane in an EX8208 switch and to the midplane in an EX8216 switch. The backplane and the midplane distribute the output power produced by the power supplies to different switch components. Each AC power supply provides power to all the components in the switch.

Each power supply has its own fan and is cooled by its own internal cooling system. The airflow is from the front of the power supply to the back. Hot air exhausts from the rear of the chassis.

EX8200 switches support both 2000 W AC power supplies and 3000 W AC power supplies.

The 2000 W AC power supply supports both the low-voltage line (100–120 VAC) and the high-voltage line (200–240 VAC) AC power configurations. In both cases, the output

is 52 VDC. The output power is 1200 W for low-voltage line input and 2000 W for high-voltage line input.

The 3000 W AC power supply supports only the high-voltage line input (200–240 VAC) AC power configuration. Low-voltage line input is not supported for the 3000 W AC power supplies on the EX8200 switches. The output is 52 VDC. The output power is 3000 W for high-voltage line input.

## N+1 Redundancy Configuration of AC Power Supplies

N+1 redundancy configuration is required for normal operation of EX8200 switches. In an N+1 redundancy configuration, if one power supply fails or is removed, the remaining power supplies continue to supply power for the switch without interruption.

Depending on the configuration type of the switch and the input voltage, determine the number of power supplies needed (N) for a switch. Install an additional power supply to meet the required N+1 redundancy configuration. For details about different switch configurations, see “EX8208 Switch Configurations” on page 6 or EX8216 Switch Configurations.

The tables in this section list the N+1 power requirements for different EX8200 switch configurations:

- Table 17 on page 42—Lists the N+1 power requirements of EX8208 switch configurations that use 2000 W AC power supplies.
- Table 18 on page 43—Lists the N+1 power requirements of EX8208 switch configurations that use 3000 W AC power supplies.
- Table 19 on page 43—Lists the N+1 power requirements of EX8216 switch configurations that use 2000 W AC power supplies.
- Table 20 on page 43—Lists the N+1 power requirements of EX8216 switch configurations that use 3000 W AC power supplies.

**Table 17: N+1 Power Redundancy Configurations for Different EX8208 Switch Configurations Using 2000 W AC Power Supplies**

Switch Configuration	Input Voltage	Power Supplies Needed (N)	Power Supplies Needed for N+1
Base	High-voltage line (200–240 VAC)	1	2
	Low-voltage line (100–120 VAC)	2	3
Fully loaded with 8-port SFP+ line cards	High-voltage line (200–240 VAC)	3	4
	Low-voltage line (100–120 VAC)	5	6



**Table 18: N+1 Power Redundancy Configurations for Different EX8208 Switch Configurations Using 3000 W AC Power Supplies**

Switch Configuration	Input Voltage	Power Supplies Needed (N)	Power Supplies Needed for N+1
Base	High-voltage line (200–240 VAC)	1	2
Fully loaded with 8-port SFP+ line cards	High-voltage line (200–240 VAC)	2	3

**Table 19: N+1 Power Redundancy Configurations for Different EX8216 Switch Configurations Using 2000 W AC Power Supplies**

Switch Configuration	Input Voltage	Power Supplies Needed (N)	Power Supplies Needed for N+1
Base	High-voltage line (200–240 VAC)	2	3
	Low-voltage line (100–120 VAC)	2	3
Fully loaded with 8-port SFP+ line cards	High-voltage line (200–240 VAC)	5	6
	Low-voltage line (100–120 VAC)	Not supported	Not supported

**Table 20: N+1 Power Redundancy Configurations for Different EX8216 Switch Configurations Using 3000 W AC Power Supplies**

Switch Configuration	Input Voltage	Power Supplies Needed (N)	Power Supplies Needed for N+1
Base	High-voltage line (200–240 VAC)	1	2
Fully loaded with 8-port SFP+ line cards	High-voltage line (200–240 VAC)	4	5

### N+N Redundancy Configuration of AC Power Supplies

You can optionally configure your switch for N+N redundancy, in which N power supplies can be removed or fail and the remaining N power supplies continue to supply power for the switch without interruption. A common application for N+N redundancy is to have a dual power feed for AC power supplies.

How many power supplies you require for N+N redundancy can depend on which Junos OS Release your switch is running:

- Junos OS Release 10.1 or earlier—Consult Table 17 on page 42, Table 19 on page 43, or Table 20 on page 43 to determine the number of power supplies needed (N). Then multiply the N value by two.



NOTE: In Junos OS Release 10.1 or earlier, the power management feature manages switches for N+1 redundancy only. This means, for example, that power management raises an alarm if there is insufficient power to maintain N+1 redundancy, but not if there is insufficient power to maintain N+N redundancy.

- Junos OS Release 10.2 or later—Consult Table 21 on page 45, Table 23 on page 45, or Table 24 on page 46 in this section.

Starting with Junos OS Release 10.2, you can configure the power management software to manage the switch power for N+N redundancy. When you configure power management for N+N redundancy, power management lowers the maximum chassis power consumption by lowering the maximum fan speed. It does so to compensate for the extra power that is held in reserve in an N+N configuration than in an N+1 configuration, because of which less power would ordinarily be available to power line cards. By reducing the maximum chassis power consumption, power management allows the switch to power more line cards.

The configuration type of the switch and the input voltage determine the number of power supplies needed (N) for the switch. You must then install additional power supplies to meet the N+N redundancy configuration. For details about different switch configurations, see “EX8208 Switch Configurations” on page 6 or EX8216 Switch Configurations.

The tables in this section list the N+N power requirements for different EX8200 switch configurations:

- Table 21 on page 45—Lists the N+N power requirements of EX8208 switch configurations that use 2000 W AC power supplies.
- Table 22 on page 45—Lists the N+N power requirements of EX8208 switch configurations that use 3000 W AC power supplies.
- Table 23 on page 45—Lists the N+N power requirements of EX8216 switch configurations that use 2000 W AC power supplies.
- Table 24 on page 46—Lists the N+N power requirements of EX8216 switch configurations that use 3000 W AC power supplies.

**Table 21: N+N Power Supply Requirements for EX8208 Switch Configurations Using 2000 W AC Power Supplies (Junos OS Release 10.2 or Later Only)**

Switch Configuration	Input Voltage	Power Supplies Needed (N)	Power Supplies Needed for N+N
Base	High-voltage line (200–240 VAC)	1	2
	Low-voltage line (100–120 VAC)	1	2
Fully loaded with 8-port SFP+ line cards	High-voltage line (200–240 VAC)	3	6
	Low-voltage line (100–120 VAC)	4	Not Supported

**Table 22: N+N Power Supply Requirements for EX8208 Switch Configurations Using 3000 W AC Power Supplies (Junos OS Release 10.2 or Later Only)**

Switch Configuration	Input Voltage	Power Supplies Needed (N)	Power Supplies Needed for N+N
Base	High-voltage line (200–240 VAC)	1	2
Fully loaded with 8-port SFP+ line cards	High-voltage line (200–240 VAC)	2	4

**Table 23: N+N Power Supply Requirements for EX8216 Switch Configurations Using 2000 W AC Power Supplies (Junos OS Release 10.2 or Later Only)**

Switch Configuration	Input Voltage	Power Supplies Needed (N)	Power Supplies Needed for N+N
Base	High-voltage line (200–240 VAC)	1	2
	Low-voltage line (100–120 VAC)	2	4
Fully loaded with 8-port SFP+ line cards	High-voltage line (200–240 VAC)	5	Not supported
	Low-voltage line (100–120 VAC)	Not supported	Not supported

**Table 24: N+N Power Supply Requirements for EX8216 Switch Configurations Using 3000 W AC Power Supplies (Junos OS Release 10.2 or Later Only)**

Switch Configuration	Input Voltage	Power Supplies Needed (N)	Power Supplies Needed for N+N
Base	High-voltage line (200–240 VAC)	1	2
Fully loaded with 8-port SFP+ line cards	High-voltage line (200–240 VAC)	3	6

- Related Topics**
- AC Power Specifications for EX8200 Switches on page 109
  - AC Power Supply LEDs in an EX8200 Switch on page 46
  - Calculating Power Requirements for an EX8208 Switch on page 114
  - Calculating Power Requirements for an EX8216 Switch
  - Installing an AC Power Supply in an EX8200 Switch on page 150
  - Removing an AC Power Supply from an EX8200 Switch on page 207

### AC Power Supply LEDs in an EX8200 Switch

An AC power supply has three LEDs on its faceplate. These LEDs display information about the status of the power supply. See Figure 27 on page 46.

**Figure 27: AC Power Supply LEDs on an EX8200 Switch**

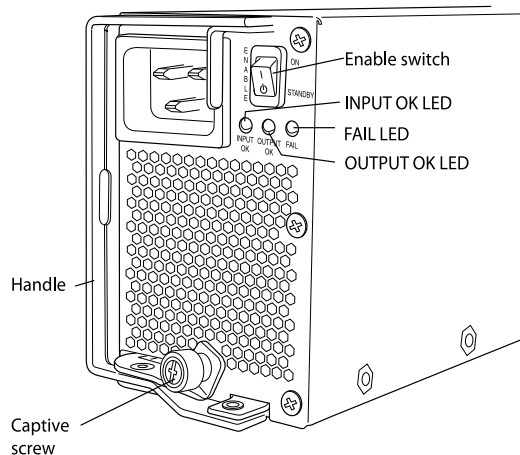


Table 25 on page 47 describes the LEDs on an AC power supply in an EX8200 switch.

Table 25: Power Supply LEDs on EX8200 Switches

LED	State	Description
INPUT OK	Unlit	Indicates one of the following: <ul style="list-style-type: none"> <li>Power supply is disconnected from AC power feed.</li> <li>AC power input voltage is not within normal operating range.</li> <li>No AC power input.</li> </ul>
	Green	<ul style="list-style-type: none"> <li>AC power input is high-voltage line (200–240 VAC).</li> </ul>
	Yellow	<ul style="list-style-type: none"> <li>AC power input is low-voltage line (100–120 VAC).</li> </ul>
	NOTE: This LED state applies only to 2000 W AC power supplies.	
OUTPUT OK	Unlit	Indicates one of the following: <ul style="list-style-type: none"> <li>DC output voltage is not within normal operating range.</li> <li>Power supply is not supplying DC power correctly.</li> </ul>
	Green	<ul style="list-style-type: none"> <li>DC power output is within normal operating range.</li> </ul>
	Yellow	<ul style="list-style-type: none"> <li>Power supply has been disabled internally by the system.</li> </ul>
FAIL	Unlit	<ul style="list-style-type: none"> <li>Power supply is functioning normally.</li> </ul>
	Yellow	<ul style="list-style-type: none"> <li>On steadily—Power supply has failed.</li> <li>Blinking—Demand for output power exceeds the supply.</li> </ul>



NOTE: If the INPUT OK LED and the OUTPUT OK LED are unlit, the AC power cord is not installed properly or the power supply has failed.

If the INPUT OK LED is lit and the OUTPUT OK LED is unlit, the AC power supply is not installed properly or the power supply has an internal failure.

If the FAIL LED is lit, the power supply has failed and must be replaced. If the FAIL LED is blinking, add a power supply to balance the power demand and supply.

#### Related Topics

- AC Power Specifications for EX8200 Switches on page 109
- Power Requirements for EX8208 Switch Components on page 111
- Power Requirements for EX8216 Switch Components
- AC Power Cord Specifications for an EX8200 Switch on page 112
- Connecting AC Power to an EX8200 Switch on page 173

## DC Power Supply in an EX8200 Switch

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The DC power supplies in EX8200 switches are hot-removable and hot-insertable field-replaceable units (FRUs).



NOTE: EX8208 switches support 2000 W DC power supplies.  
EX8216 switches support 3000 W DC power supplies.

You can install up to six DC power supplies in an EX8200 switch. Power supplies are installed at the bottom of the chassis in slots labeled PSU 0 through PSU 5 (left to right). See “Slot Numbering for an EX8208 Switch” on page 13 and Slot Numbering for an EX8216 Switch. All power supplies are accessible from the front of the chassis.



WARNING: The switch is pluggable type A equipment installed in a restricted-access location. It has a separate protective earthing terminal provided on the chassis. This separate protective earthing terminal must be permanently connected to earth ground.



NOTE: EX8216 switches have two protective earthing terminals provided on the chassis, one on the left side of the chassis and the other on the rear of the chassis. Only one of these protective earthing terminals needs to be permanently connected to earth ground. See Chassis Physical Specifications of an EX8216 Switch for the location of the protective earthing terminals.



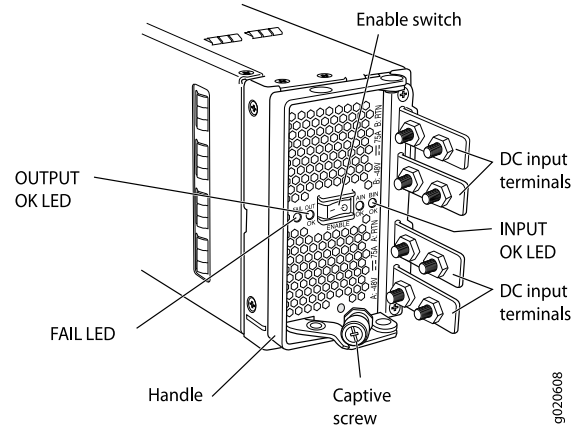
NOTE: DC power supplies are shipped only in the redundant configuration of EX8200 switches.

See “EX8208 Switch Configurations” on page 6 for details about different EX8208 switch configurations.

See EX8216 Switch Configurations for details about different EX8216 switch configurations.

Each DC power supply weighs approximately 7 lb (3.2 kg) and has two independent pairs of DC input lugs (A: -48V A: RTN and B: - 48V B: RTN ) on the front of the power supply. Each power supply also has an **Enable** switch, a fan, and four LEDs on the faceplate that indicate the status of the power supply. See Figure 28 on page 49.

Figure 28: DC Power Supply



**NOTE:** A 2000 W DC power supply requires a dedicated 60 A circuit breaker for each input DC feed.

A 3000 W DC power supply requires a dedicated 100 A circuit breaker for each input DC feed.

Each DC power supply connects to the backplane in an EX8208 switch and to the midplane in an EX8216 switch. The backplane in an EX8208 switch and the midplane in an EX8216 switch distribute the output power produced by the power supplies to different switch components. Each DC power supply provides power to all the components in the switch.

The output of each 2000 W DC power supply is 52 VDC. The output power is 2000 W.

The output of each 3000 W DC power supply is 52 VDC. The output power is 3000 W.

A DC power supply works with only one input DC feed connected. It is able to deliver the full output power to all chassis components with only one DC feed connected.

Each DC power supply has its own fan and is cooled by its own internal cooling system. The airflow is from the front of the power supply to the back. Hot air exhausts from the rear of the chassis.

The minimum power configuration required by an EX8200 switch is an N+1 power configuration. In an N+1 power configuration, if one power supply fails or is removed, the remaining power supplies continue to supply power for the system without interruption.

The configuration type of the switch and the input voltage determine the number of power supplies needed (N) for a switch. You must install an additional power supply to meet the required N+1 power redundancy configuration. The DC power supplies each provide independent A and B power feeds, so that dual power feed redundancy is available even in an N+1 configuration. See “EX8208 Switch Configurations” on page 6 for details about different EX8208 switch configurations. See EX8216 Switch Configurations for details about different EX8216 switch configurations.

The tables in this section list the N+1 power requirements of different EX8200 switch configurations:

- Table 26 on page 50—Lists the N+1 power requirements of EX8208 switch configurations that use 2000 W DC power supplies.
- Table 27 on page 50—Lists the N+1 power requirements of EX8216 switch configurations that use 3000 W DC power supplies.

**Table 26: N+1 Power Redundancy Configurations for Different EX8208 Switch Configurations Using 2000 W DC Power Supplies**

Switch Configuration	Input Voltage	Power Supplies Needed (N)	Power Supplies Needed for N+1
Base	-40 VDC through -72 VDC	1	2
Fully loaded with 8-port SFP+ line cards	-40 VDC through -72 VDC	3	4

**Table 27: N+1 Power Redundancy Configurations for Different EX8216 Switch Configurations Using 3000 W DC Power Supplies**

Switch Configuration	Input Voltage	Power Supplies Needed (N)	Power Supplies Needed for N+1
Base	-40 VDC through -72 VDC	1	2
Fully loaded with 8-port SFP+ line cards	-40 VDC through -72 VDC	4	5

- Related Topics**
- DC Power Specifications for EX8200 Switches on page 110
  - DC Power Supply LEDs in an EX8200 Switch on page 50
  - Calculating Power Requirements for an EX8216 Switch
  - Installing a DC Power Supply in an EX8200 Switch on page 152
  - Removing a DC Power Supply from an EX8200 Switch on page 209

## DC Power Supply LEDs in an EX8200 Switch

A DC power supply has four LEDs on its faceplate: **FAIL**, **OUT OK**, **A IN OK**, and **B IN OK** LEDs. The text **A** or **B** next to the **OK IN** LEDs indicates which input lug the LED corresponds to. All four LEDs display information about the status of the power supply. See Figure 29 on page 51.





NOTE: EX8208 switches support 2000 W DC power supplies.  
EX8216 switches support 3000 W DC power supplies.

Figure 29: DC Power Supply LEDs in an EX8200 Switch

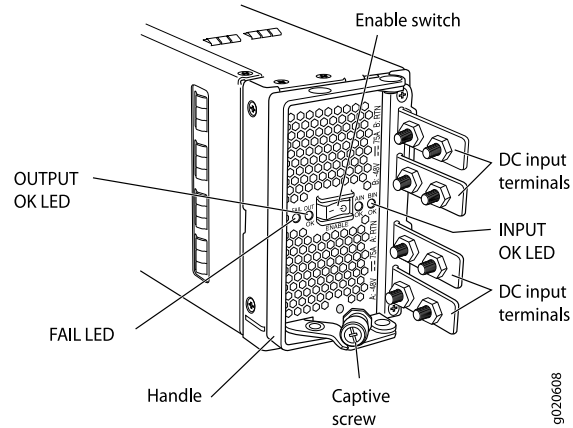


Table 28 on page 51 describes the LEDs on a DC power supply in EX8200 switches.

Table 28: DC Power Supply LEDs in EX8200 Switches

LED	State	Description
A IN OK	Unlit	Indicates one of the following: <ul style="list-style-type: none"> <li>Power supply is disconnected from DC power feed.</li> <li>DC power input voltage is not within normal operating range (-40 VDC through -72 VDC).</li> <li>No DC power input.</li> </ul>
	Green	<ul style="list-style-type: none"> <li>DC power input voltage is within normal operating range (-40 VDC through -72 VDC).</li> </ul>
	Yellow	<ul style="list-style-type: none"> <li>DC input is present on the terminals but either the fuse is tripped or the ORing diode is open.</li> </ul>
	Red	<ul style="list-style-type: none"> <li>DC power input voltage is reversed in polarity.</li> </ul>

NOTE: The DC power supply is protected against reverse polarity input for both DC input feeds.

Table 28: DC Power Supply LEDs in EX8200 Switches (*continued*)

LED	State	Description
B IN OK	Unlit	Indicates one of the following: <ul style="list-style-type: none"> <li>Power supply is disconnected from DC power feed.</li> <li>DC power input voltage is not within normal operating range (-40 VDC through -72 VDC).</li> <li>No DC power input.</li> </ul>
	Green	<ul style="list-style-type: none"> <li>DC power input voltage is within the normal operating range (-40 VDC through -72 VDC).</li> </ul>
	Yellow	<ul style="list-style-type: none"> <li>DC input is present on the terminals but either the fuse is tripped or the ORing diode is open.</li> </ul>
	Red	<ul style="list-style-type: none"> <li>DC power input voltage is reversed in polarity.</li> </ul> <p>NOTE: The DC power supply is protected against reverse polarity input for both DC input feeds.</p>
OUT OK	Unlit	Indicates one of the following: <ul style="list-style-type: none"> <li>DC output voltage is not within normal operating range.</li> <li>Power supply is not supplying DC power correctly.</li> </ul>
	Green	<ul style="list-style-type: none"> <li>DC power output is within normal operating range.</li> </ul>
	Yellow	<ul style="list-style-type: none"> <li>Power supply has been disabled internally by the system.</li> </ul>
FAIL	Unlit	<ul style="list-style-type: none"> <li>Power supply is functioning normally.</li> </ul>
	Yellow	<ul style="list-style-type: none"> <li>On steadily—Power supply has failed.</li> <li>Blinking—Demand for output power exceeds the supply.</li> </ul>



NOTE: If the IN OK LED and the OUT OK LED are unlit, the power cords are not installed properly or the power supply has failed.

If the IN OK LED is lit green and the OUT OK LED is unlit, the power supply is not installed properly or the power supply has an internal failure.

If the FAIL LED is lit, the power supply has failed and must be replaced. If the FAIL LED is blinking, add a power supply to balance the power demand and supply.

#### Related Topics

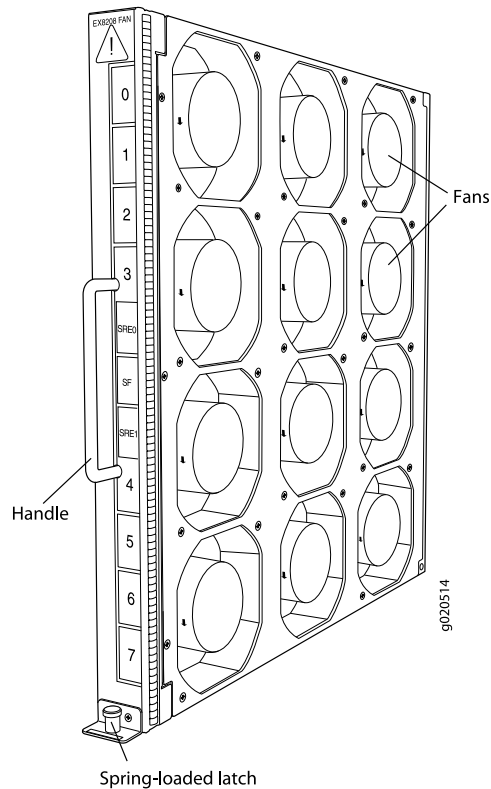
- DC Power Specifications for EX8200 Switches on page 110
- Power Requirements for EX8216 Switch Components
- Connecting DC Power to an EX8200 Switch on page 175

## Cooling System and Airflow in an EX8208 Switch

The cooling system in an EX8208 switch consists of a single fan tray. The fan tray is a hot-insertable and hot-removable field-replaceable unit (FRU). The fan tray contains 12 fans.

The fan tray installs vertically on the left side on the front of the chassis and provides side-to-side chassis cooling. A handle on the front faceplate facilitates handling of the fan tray. See Figure 30 on page 53.

Figure 30: Fan Tray for an EX8208 Switch



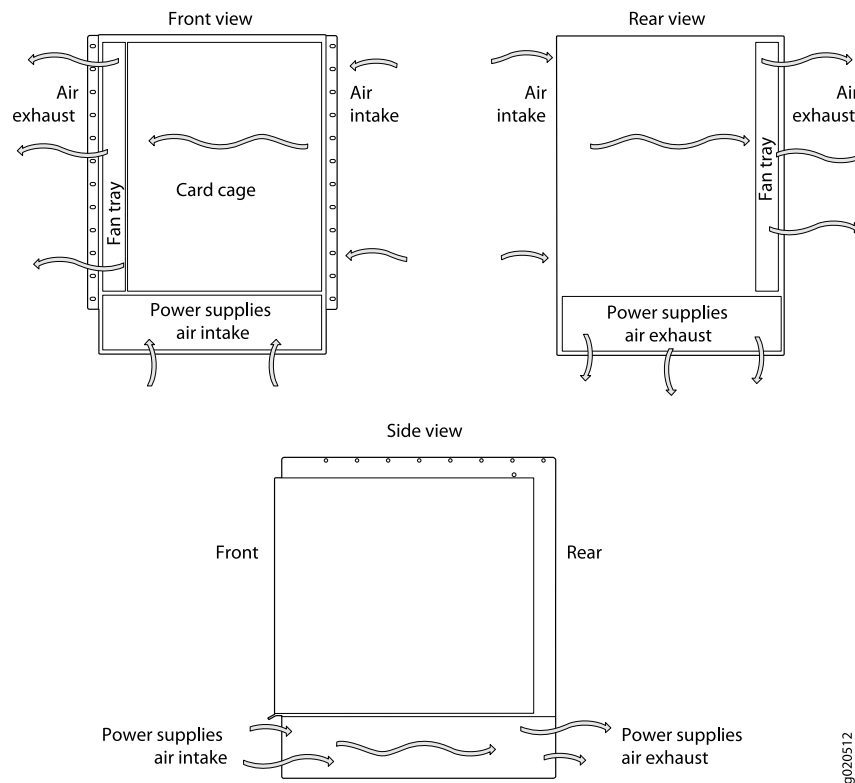
The fan tray can be removed and replaced from the front of the chassis. The switch continues to operate for a limited time (2 minutes) during the replacement of the fan tray without thermal shutdown.



**CAUTION:** You must replace the fan tray within 2 minutes of removing it.

The air intake to cool the chassis is located on the right side of the chassis. Air is pulled into the chassis and is pushed through the line card cage towards the fan tray. Hot air exhausts from the left side of the chassis. See Figure 31 on page 54.

Figure 31: Airflow Through the EX8208 Switch Chassis



The Switch Fabric and Routing Engine (SRE) module monitors the temperature of switch components. Under normal operating conditions, the fans in the fan tray run at less than full speed. The fans are controlled by two fan tray controllers. The fans are numbered 1 through 12. Fans 1 through 6 are controlled by the first fan tray controller. Fans 7 through 12 are controlled by the second fan tray controller. If one fan tray controller fails, the other fan tray controller keeps half the fans working. This allows the switch to continue to operate normally as long as the remaining fans cool the chassis sufficiently.

If a fan fails or the ambient temperature rises above the threshold 113°F (45°C), the speed of the remaining fans is automatically adjusted to keep the temperature within the acceptable range, 32°F (0°C) through 104°F (40°C).

The fan tray continues to operate indefinitely and provide sufficient cooling even when a single fan fails provided the room temperature is within the operating range. You can check the status of fans and the chassis temperature from the Environment Status option in the Status menu on the LCD panel. See “LCD Panel in an EX8200 Switch” on page 17.

You cannot replace a single fan. If one or more fans fail, you must replace the entire fan tray.



**WARNING:** There is no fan guard on the fans. Be careful to keep your fingers clear of moving fan blades when you are removing the fan tray.

- Related Topics**
- Field-Replaceable Units in an EX8208 Switch on page 23
  - Installing a Fan Tray in an EX8208 Switch on page 154
  - Removing a Fan Tray from an EX8208 Switch on page 211

## Backplane in an EX8208 Switch

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The backplane is a printed circuit board that forms the back of the line card cage. The Switch Fabric and Routing Engine (SRE) modules, Switch Fabric (SF) module, power supplies, and line cards plug into the backplane from the front of the chassis. The backplane contains an EEPROM that stores the serial number and revision level of the backplane.

The backplane performs the following functions:

- Power distribution—The backplane distributes power to all the switch components from the power supplies that plug into it.
- Control-signal connectivity—The backplane transports the control signals exchanged by system components for monitoring, control, and management purposes.
- Transfer of data between line cards and SRE modules—The backplane provides connectivity for data traffic to and from the line cards and the SRE modules.



**WARNING:** High levels of electrical energy are distributed across the switch backplane. Do not touch the backplane connectors, or any component connected to the backplane, with any metallic object while servicing components installed in the switch.

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- Related Topics**
- AC Power Supply in an EX8200 Switch on page 40



## CHAPTER 3

# Component Specifications

- USB Port Specifications for an EX Series Switch on page 57
- Console Port Connector Pinout Information for an EX Series Switch on page 58
- Management Port Connector Pinout Information for an EX8200 Switch on page 59
- Optical Interface Support in EX8200 Switches on page 60
- SFP+ Direct Attach Cables for EX Series Switches on page 83
- Grounding Cable and Lug Specifications for EX8200 Switches on page 87

### USB Port Specifications for an EX Series Switch

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The following Juniper Networks USB flash drives have been tested and are officially supported for the USB port on all EX Series switches:

- RE-USB-1G-S
- RE-USB-2G-S
- RE-USB-4G-S



**CAUTION:** Any USB memory product not listed as supported for EX Series switches has not been tested by Juniper Networks. The use of any unsupported USB memory product could expose your EX Series switch to unpredictable behavior. Juniper Networks Technical Assistance Center (JTAC) can provide only limited support for issues related to unsupported hardware. We strongly recommend that you use only supported USB flash drives.

All USB flash drives used on EX Series switches must have the following features:

- USB 2.0 or later.
- Formatted with a FAT or MS-DOS file system.
- If the switch is running Junos OS Release 9.5 or earlier, the formatting method must use a master boot record. Windows formatting, by default, does not use a master boot record. See the documentation for your USB flash drive for information on how your USB flash drive is formatted.

- Related Topics**
- See Rear Panel of an EX2200 Switch for port location.
  - See Rear Panel of an EX3200 Switch for port location.
  - See Rear Panel of an EX4200 Switch for port location.
  - See Front Panel of an EX4500 Switch for port location.
  - See Switch Fabric and Routing Engine (SRE) Module in an EX8208 Switch on page 24 for port location.
  - See Routing Engine (RE) Module in an EX8216 Switch for port location.
  - Booting an EX Series Switch Using a Software Package Stored on a USB Flash Drive

## Console Port Connector Pinout Information for an EX Series Switch

The console port on an EX Series switch is an RS-232 serial interface that uses an RJ-45 connector to connect to a console management device. The default baud rate for the console port is 9600 baud.

Table 29 on page 58 provides the pinout information for the RJ-45 console connector. An RJ-45 cable and an RJ-45 to DB-9 serial port adapter are supplied with the switch.



**NOTE:** If your laptop or PC does not have a DB-9 male connector pin and you want to connect your laptop or PC directly to an EX Series switch, use a combination of the RJ-45 to DB-9 female adapter supplied with the switch and a USB to DB-9 male adapter. You must provide the USB to DB-9 male adapter.

**Table 29: EX Series Switches Console Port Connector Pinout Information**

Pin	Signal	Description
1	RTS Output	Request to send
2	DTR Output	Data terminal ready
3	TxD Output	Transmit data
4	Signal Ground	Signal ground
5	Signal Ground	Signal ground
6	RxD Input	Receive data
7	CD Input	Data carrier detect
8	CTS Input	Clear to send

- Related Topics**
- See Rear Panel of an EX2200 Switch for port location.



- See Rear Panel of an EX3200 Switch for port location.
- See Rear Panel of an EX4200 Switch for port location.
- See Front Panel of an EX4500 Switch for port location.
- See Switch Fabric and Routing Engine (SRE) Module in an EX8208 Switch on page 24 for port location.
- See Routing Engine (RE) Module in an EX8216 Switch for port location.
- Connecting an EX Series Switch to a Management Console on page 181

## Management Port Connector Pinout Information for an EX8200 Switch

The management port on an EX8200 switch uses an RJ-45 connector to connect to a management device for out-of-band management.

The port uses an autosensing RJ-45 connector to support a 10/100/1000Base-T connection. Two LEDs on the port indicate link/activity on the port and the administrative status of the port. See “Management Port LEDs in EX8200 Switches” on page 27.

Table 30 on page 59 provides the pinout information of the RJ-45 connector. An RJ-45 cable, with a connector attached, is supplied with the switch.

**Table 30: Management Port Connector Pinout Information for EX8200 Switches**

Pin	Signal	Description
1	TRP1+	Transmit/receive data pair 1
2	TRP1-	Transmit/receive data pair 1
3	TRP2+	Transmit/receive data pair 2
4	TRP3+	Transmit/receive data pair 3
5	TRP3-	Transmit/receive data pair 3
6	TRP2-	Transmit/receive data pair 2
7	TRP4+	Transmit/receive data pair 4
8	TRP4-	Transmit/receive data pair 4

- Related Topics**
- See Switch Fabric and Routing Engine (SRE) Module in an EX8208 Switch on page 24 for port location.
  - See Routing Engine (RE) Module in an EX8216 Switch for port location.
  - Connecting an EX Series Switch to a Network for Out-of-Band Management on page 187

## Optical Interface Support in EX8200 Switches

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This topic describes the optical interfaces supported for transceivers used in the SFP and SFP+ line cards for EX8200 switches. It also lists the copper interface supported for the SFP transceivers.



NOTE: Use only optical transceivers and optical connectors purchased from Juniper Networks for your EX Series switch.

The Gigabit Ethernet SFP and SFP+ transceivers installed in EX8200 switches support digital optical monitoring (DOM): you can view the diagnostic details for these transceivers by issuing the operational mode CLI command **show interfaces diagnostics optics**. The command does not give any output for copper transceivers, Fast Ethernet transceivers, or transceivers not purchased from Juniper Networks.

The tables in this topic describe the optical interface support over single-mode fiber-optic (SMF) and multimode fiber-optic (MMF) cables for SFP and SFP+ transceivers and over the copper interface for SFP transceivers:

- Table 31 on page 61—Optical interface support for SFP+ transceivers in 8-port SFP+ line cards
- Table 32 on page 66—Optical interface support for SFP transceivers in 40-port SFP+ line cards
- Table 33 on page 70—Optical interface support for SFP+ transceivers in 40-port SFP+ line cards
- Table 34 on page 75—Optical interface support and copper interface support for SFP transceivers in 48-port SFP line cards

Table 31: Optical Interface Support for SFP+ Transceivers in 8-port SFP+ Line Cards Used in EX8200 Switches

Ethernet Standard	Specifications			
10GBase-SR	Model Number	EX-SFP-10GE-USR		
	Rate	10 Gbps		
	Connector Type	LC		
	Fiber Count	Dual		
	Transmitter Wavelength	850 nm		
	Minimum Launch Power	-7.3 dBm		
	Maximum Launch Power	-1.3 dBm		
	Minimum Receiver Sensitivity	-11.1 dBm		
	Maximum Input Power	-9.9 dBm		
	Fiber Type	MMF		
	Core/Cladding Size	62.5/125 $\mu$ m	50/125 $\mu$ m	50/125 $\mu$ m
	Fiber Grade	OM1	OM3	OM3
	Modal Bandwidth	200 MHz/km	500 MHz/km	1500 MHz/km
	Distance	10 m (32.8 ft)	30 m (98.4 ft)	100 m (328 ft)
	DOM Support	Available		
	Software required	Junos OS for EX Series switches, Release 10.2 or later		

**Table 31: Optical Interface Support for SFP+ Transceivers in 8-port SFP+ Line Cards Used in EX8200 Switches (continued)**

Ethernet Standard	Specifications				
10GBase-SR	Model Number	EX-SFP-10GE-SR			
	Rate	10 Gbps			
	Connector Type	LC			
	Transmitter Wavelength	850 nm			
	Minimum Launch Power	-7.3 dBm			
	Maximum Launch Power	-1 dBm			
	Minimum Receiver Sensitivity	-9.9 dBm			
	Maximum Input Power	-1 dBm			
	Fiber Type	MMF			
	Core/Cladding Size	62.5/125 $\mu$ m	62.5/125 $\mu$ m	50/125 $\mu$ m	50/125 $\mu$ m
	Fiber Grade	FDDI	OM1	-	OM2 OM3
	Modal Bandwidth	160 MHz/km	200 MHz/km	400 MHz/km	500 MHz/km 1500 MHz/km
	Distance	26 m (85 ft)	33 m (108 ft)	66 m (216 ft)	82 m (269 ft) 300 m (984 ft)
	DOM Support	Available			
	Software required	Junos OS for EX Series switches, Release 9.4 or later			

**Table 31: Optical Interface Support for SFP+ Transceivers in 8-port SFP+ Line Cards Used in EX8200 Switches (continued)**

Ethernet Standard	Specifications			
10GBase-LRM	Model Number	EX-SFP-10GE-LRM		
	Rate	10 Gbps		
	Connector Type	LC		
	Fiber Count	Dual		
	Transmitter Wavelength	1310 nm		
	Minimum Launch Power	−6.5 dBm		
	Maximum Launch Power	0.5 dBm		
	Minimum Receiver Sensitivity	−21 dBm		
	Maximum Input Power	0.5 dBm		
	Fiber Type	MMF		
	Core/Cladding Size	625/125µm	50/125µm	50/125µm
	Fiber Grade	FDDI/OM1	OM2	OM3
	Modal Bandwidth	500 MHz/km	500 MHz/km	500 MHz/km
	Distance	220 m (722 ft)	220 m (722 ft)	220 m (722 ft)
	DOM Support	Available		
	Software required	Junos OS for EX Series switches, Release 9.5 or later		

Table 31: Optical Interface Support for SFP+ Transceivers in 8-port SFP+ Line Cards Used in EX8200 Switches (*continued*)

Ethernet Standard	Specifications	
10GBase-LR	Model Number	EX-SFP-10GE-LR
	Rate	10 Gbps
	Connector Type	LC
	Transmitter Wavelength	1310 nm
	Minimum Launch Power	-8.2 dBm
	Maximum Launch Power	0.5 dBm
	Minimum Receiver Sensitivity	-18 dBm
	Maximum Input Power	0.5 dBm
	Fiber Type	SMF
	Core/Cladding Size	9/125 $\mu$ m
	Modal Bandwidth	-
	Distance	10 km (6.2 miles)
	DOM Support	Available
	Software required	Junos OS for EX Series switches, Release 9.4 or later

**Table 31: Optical Interface Support for SFP+ Transceivers in 8-port SFP+ Line Cards Used in EX8200 Switches (continued)**

Ethernet Standard	Specifications	
10GBase-ER	Model Number	EX-SFP-10GE-ER
	Rate	10 Gbps
	Connector Type	LC
	Fiber Count	Dual
	Transmitter Wavelength	1550 nm
	Minimum Launch Power	−4.7 dBm
	Maximum Launch Power	4 dBm
	Minimum Receiver Sensitivity	−11.3 dBm
	Maximum Input Power	−1 dBm
	Fiber Type	SMF
	Core/Cladding Size	9/125 μm
	Modal Bandwidth	–
	Distance	40 km (24.8 miles)
	DOM Support	Available
	Software required	Junos OS for EX Series switches, Release 10.1 or later

**Table 32: Optical Interface Support and Copper Interface Support for SFP Transceivers in 40-port SFP+ Line Cards Used in EX8200 Switches**

Ethernet Standard	Specifications	
1000Base-T	Model Number	EX-SFP-1GE-T
	Rate	10/100/1000 Mbps
	Connector Type	RJ-45
	Transmitter Wavelength	–
	Minimum Launch Power	–
	Maximum Launch Power	–
	Minimum Receiver Sensitivity	–
	Maximum Input Power	–
	Fiber Type	Copper
	Core Size	–
	Modal Bandwidth	–
	Distance	100 m (328 ft)
	DOM Support	Not available
	Software required	Junos OS for EX Series switches, Release 10.3 or later



Table 32: Optical Interface Support and Copper Interface Support for SFP Transceivers in 40-port SFP+ Line Cards Used in EX8200 Switches (*continued*)

Ethernet Standard	Specifications				
1000Base-SX	Model Number	EX-SFP-1GE-SX			
	Rate	1000 Mbps			
	Connector Type	LC			
	Transmitter Wavelength	850 nm			
	Minimum Launch Power	−9.5 dBm			
	Maximum Launch Power	−3 dBm			
	Minimum Receiver Sensitivity	−21 dBm			
	Maximum Input Power	0 dBm			
	Fiber Type	MMF			
	Core Size	62.5 μm	62.5 μm	50 μm	50 μm
	Modal Bandwidth	160 MHz/km	200 MHz/km	400 MHz/km	500 MHz/km
	Distance	220 m (721 ft)	275 m (902 ft)	500 m (1640 ft)	550 m (1804 ft)
	DOM Support	Available			
	Software required	Junos OS for EX Series switches, Release 10.3 or later			

**Table 32: Optical Interface Support and Copper Interface Support for SFP Transceivers in 40-port SFP+ Line Cards Used in EX8200 Switches (*continued*)**

Ethernet Standard	Specifications	
1000Base-LX	Model Number	EX-SFP-1GE-LX
	Rate	1000 Mbps
	Connector Type	LC
	Transmitter Wavelength	1310 nm
	Minimum Launch Power	-9.5 dBm
	Maximum Launch Power	-3 dBm
	Minimum Receiver Sensitivity	-25 dBm
	Maximum Input Power	-3 dBm
	Fiber Type	SMF
	Core Size	9 $\mu$ m
	Modal Bandwidth	-
	Distance	10 km (6.2 miles)
	DOM Support	Available
	Software required	Junos OS for EX Series switches, Release 10.3 or later

**Table 32: Optical Interface Support and Copper Interface Support for SFP Transceivers in 40-port SFP+ Line Cards Used in EX8200 Switches (*continued*)**

Ethernet Standard	Specifications	
1000Base-LH (or 1000Base-ZX)	Model Number	EX-SFP-1GE-LH
	Rate	1000 Mbps
	Connector Type	LC
	Transmitter Wavelength	1550 nm
	Minimum Launch Power	-2 dBm
	Maximum Launch Power	5 dBm
	Minimum Receiver Sensitivity	-25 dBm
	Maximum Input Power	-3 dBm
	Fiber Type	SMF
	Core/Cladding Size	10 $\mu$ m
	Modal Bandwidth	-
	Distance	70 km (43.5 miles)
	DOM Support	Available
	Software required	Junos OS for EX Series switches, Release 10.3 or later

Table 33: Optical Interface Support for SFP+ Transceivers in 40-port SFP+ Line Cards Used in EX8200 Switches

Ethernet Standard	Specifications			
10GBase-SR	Model Number	EX-SFP-10GE-USR		
	Rate	10 Gbps		
	Connector Type	LC		
	Fiber Count	Dual		
	Transmitter Wavelength	850 nm		
	Minimum Launch Power	-7.3 dBm		
	Maximum Launch Power	-1.3 dBm		
	Minimum Receiver Sensitivity	-11.1 dBm		
	Maximum Input Power	-9.9 dBm		
	Fiber Type	MMF		
	Core/Cladding Size	62.5/125 $\mu$ m	50/125 $\mu$ m	50/125 $\mu$ m
	Fiber Grade	OM1	OM3	OM3
	Modal Bandwidth	200 MHz/km	500 MHz/km	1500 MHz/km
	Distance	10 m (32.8 ft)	30 m (98.4 ft)	100 m (328 ft)
	DOM Support	Available		
	Software required	Junos OS for EX Series switches, Release 10.3 or later		

**Table 33: Optical Interface Support for SFP+ Transceivers in 40-port SFP+ Line Cards Used in EX8200 Switches (continued)**

Ethernet Standard	Specifications				
10GBase-SR	Model Number	EX-SFP-10GE-SR			
	Rate	10 Gbps			
	Connector Type	LC			
	Transmitter Wavelength	850 nm			
	Minimum Launch Power	-7.3 dBm			
	Maximum Launch Power	-1 dBm			
	Minimum Receiver Sensitivity	-9.9 dBm			
	Maximum Input Power	-1 dBm			
	Fiber Type	MMF			
	Core/Cladding Size	62.5/125 µm	62.5/125 µm	50/125µm	50/125 µm
	Fiber Grade	FDDI	OM1	-	OM2
	Modal Bandwidth	160 MHz/km	200 MHz/km	400 MHz/km	500 MHz/km
	Distance	26 m (85 ft)	33 m (108 ft)	66 m (216 ft)	82 m (269 ft)
	DOM Support	Available			
	Software required	Junos OS for EX Series switches, Release 10.3 or later			

Table 33: Optical Interface Support for SFP+ Transceivers in 40-port SFP+ Line Cards Used in EX8200 Switches (*continued*)

Ethernet Standard	Specifications			
10GBase-LRM	Model Number	EX-SFP-10GE-LRM		
	Rate	10 Gbps		
	Connector Type	LC		
	Fiber Count	Dual		
	Transmitter Wavelength	1310 nm		
	Minimum Launch Power	-6.5 dBm		
	Maximum Launch Power	0.5 dBm		
	Minimum Receiver Sensitivity	-21 dBm		
	Maximum Input Power	0.5 dBm		
	Fiber Type	MMF		
	Core/Cladding Size	625/125µm	50/125µm	50/125µm
	Fiber Grade	FDDI/OM1	OM2	OM3
	Modal Bandwidth	500 MHz/km	500 MHz/km	500 MHz/km
	Distance	220 m (722 ft)	220 m (722 ft)	220 m (722 ft)
	DOM Support	Available		
	Software required	Junos OS for EX Series switches, Release 10.3 or later		

**Table 33: Optical Interface Support for SFP+ Transceivers in 40-port SFP+ Line Cards Used in EX8200 Switches (*continued*)**

Ethernet Standard	Specifications	
10GBase-LR	Model Number	EX-SFP-10GE-LR
	Rate	10 Gbps
	Connector Type	LC
	Transmitter Wavelength	1310 nm
	Minimum Launch Power	-8.2 dBm
	Maximum Launch Power	0.5 dBm
	Minimum Receiver Sensitivity	-18 dBm
	Maximum Input Power	0.5 dBm
	Fiber Type	SMF
	Core/Cladding Size	9/125 $\mu$ m
	Modal Bandwidth	-
	Distance	10 km (6.2 miles)
	DOM Support	Available
	Software required	Junos OS for EX Series switches, Release 10.3 or later

Table 33: Optical Interface Support for SFP+ Transceivers in 40-port SFP+ Line Cards Used in EX8200 Switches (*continued*)

Ethernet Standard	Specifications	
10GBase-ER	Model Number	EX-SFP-10GE-ER
	Rate	10 Gbps
	Connector Type	LC
	Fiber Count	Dual
	Transmitter Wavelength	1550 nm
	Minimum Launch Power	-4.7 dBm
	Maximum Launch Power	4 dBm
	Minimum Receiver Sensitivity	-11.3 dBm
	Maximum Input Power	-1 dBm
	Fiber Type	SMF
	Core/Cladding Size	9/125 $\mu$ m
	Modal Bandwidth	-
	Distance	40 km (24.8 miles)
	DOM Support	Available
	Software required	Junos OS for EX Series switches, Release 10.3 or later



**Table 34: Optical Interface Support and Copper Interface Support for SFP Transceivers in 48-port SFP Line Cards Used in EX8200 Switches**

Ethernet Standard	Specifications	
1000Base-T	Model Number	EX-SFP-1GE-T
	Rate	10/100/1000 Mbps
	Connector Type	RJ-45
	Transmitter Wavelength	–
	Minimum Launch Power	–
	Maximum Launch Power	–
	Minimum Receiver Sensitivity	–
	Maximum Input Power	–
	Fiber Type	Copper
	Core Size	–
	Modal Bandwidth	–
	Distance	100 m (328 ft)
	DOM Support	Not available
	Software required	Junos OS for EX Series switches, Release 9.4 or later

**Table 34: Optical Interface Support and Copper Interface Support for SFP Transceivers in 48-port SFP Line Cards Used in EX8200 Switches (*continued*)**

Ethernet Standard	Specifications				
1000Base-SX	Model Number	EX-SFP-1GE-SX			
	Rate	1000 Mbps			
	Connector Type	LC			
	Transmitter Wavelength	850 nm			
	Minimum Launch Power	−9.5 dBm			
	Maximum Launch Power	−3 dBm			
	Minimum Receiver Sensitivity	−21 dBm			
	Maximum Input Power	0 dBm			
	Fiber Type	MMF			
	Core Size	62.5 μm	62.5 μm	50 μm	50 μm
	Modal Bandwidth	160 MHz/km	200 MHz/km	400 MHz/km	500 MHz/km
	Distance	220 m (721 ft)	275 m (902 ft)	500 m (1640 ft)	550 m (1804 ft)
	DOM Support	Available			
	Software required	Junos OS for EX Series switches, Release 9.4 or later			

**Table 34: Optical Interface Support and Copper Interface Support for SFP Transceivers in 48-port SFP Line Cards Used in EX8200 Switches (*continued*)**

Ethernet Standard	Specifications	
100Base-FX	Model Number	EX-SFP-IFE-FX
	Rate	100 Mbps
	Connector Type	LC
	Transmitter Wavelength	1310 nm
	Minimum Launch Power	-20 dBm
	Maximum Launch Power	-14 dBm
	Minimum Receiver Sensitivity	-32.5 dBm
	Maximum Input Power	-8 dBm
	Fiber Type	MMF
	Core Size	62.5 $\mu$ m
	Modal Bandwidth	-
	Distance	2 km (1.2 miles)
	DOM Support	Not available
	Software required	Junos OS for EX Series switches, Release 9.4 or later

**Table 34: Optical Interface Support and Copper Interface Support for SFP Transceivers in 48-port SFP Line Cards Used in EX8200 Switches (*continued*)**

Ethernet Standard	Specifications	
1000Base-LX	Model Number	EX-SFP-1GE-LX
	Rate	1000 Mbps
	Connector Type	LC
	Transmitter Wavelength	1310 nm
	Minimum Launch Power	-9.5 dBm
	Maximum Launch Power	-3 dBm
	Minimum Receiver Sensitivity	-25 dBm
	Maximum Input Power	-3 dBm
	Fiber Type	SMF
	Core Size	9 $\mu$ m
	Modal Bandwidth	-
	Distance	10 km (6.2 miles)
	DOM Support	Available
	Software required	Junos OS for EX Series switches, Release 9.4 or later

**Table 34: Optical Interface Support and Copper Interface Support for SFP Transceivers in 48-port SFP Line Cards Used in EX8200 Switches (*continued*)**

Ethernet Standard	Specifications	
100Base-LX	Model Number	EX-SFP-IFE-LX
	Rate	100 Mbps
	Connector Type	LC
	Fiber Count	Dual
	Transmitter Wavelength	1310 nm
	Minimum Launch Power	-15 dBm
	Maximum Launch Power	-8 dBm
	Minimum Receiver Sensitivity	-31.5 dBm
	Maximum Input Power	-8 dBm
	Fiber Type	SMF
	Core/Cladding Size	9/125 $\mu$ m
	Modal Bandwidth	-
	Distance	10 km (6.2 miles)
	DOM Support	Not available
	Software required	Junos OS for EX Series switches, Release 10.2 or later

**Table 34: Optical Interface Support and Copper Interface Support for SFP Transceivers in 48-port SFP Line Cards Used in EX8200 Switches (*continued*)**

Ethernet Standard	Specifications	
1000Base-LX	Model Number	EX-SFP-1GE-LX40K
	Rate	1000 Mbps
	Connector Type	LC
	Fiber Count	Dual
	Transmitter Wavelength	1310 nm
	Minimum Launch Power	-14 dBm
	Maximum Launch Power	-8 dBm
	Minimum Receiver Sensitivity	-45 dBm
	Maximum Input Power	-3 dBm
	Fiber Type	SMF
	Core/Cladding Size	9/125 $\mu$ m
	Modal Bandwidth	-
	Distance	40 km (24.8 miles)
	DOM Support	Available
	Software required	Junos OS for EX Series switches, Release 9.6 or later

**Table 34: Optical Interface Support and Copper Interface Support for SFP Transceivers in 48-port SFP Line Cards Used in EX8200 Switches (*continued*)**

Ethernet Standard	Specifications	
100Base-LX40K	Model Number	EX-SFP-IFE-LX40K
	Rate	100 Mbps
	Connector Type	LC
	Fiber Count	Dual
	Transmitter Wavelength	1310 nm
	Minimum Launch Power	-5 dBm
	Maximum Launch Power	0 dBm
	Minimum Receiver Sensitivity	-32 dBm
	Maximum Input Power	-8 dBm
	Fiber Type	SMF
	Core/Cladding Size	9/125 $\mu$ m
	Modal Bandwidth	-
	Distance	40 km (24.8 miles)
	DOM Support	Not available
	Software required	Junos OS for EX Series switches, Release 10.2 or later

Table 34: Optical Interface Support and Copper Interface Support for SFP Transceivers in 48-port SFP Line Cards Used in EX8200 Switches (*continued*)

Ethernet Standard	Specifications	
1000Base-LH (also called 1000Base-ZX)	Model Number	EX-SFP-1GE-LH
	Rate	1000 Mbps
	Connector Type	LC
	Transmitter Wavelength	1550 nm
	Minimum Launch Power	-2 dBm
	Maximum Launch Power	5 dBm
	Minimum Receiver Sensitivity	-25 dBm
	Maximum Input Power	-3 dBm
	Fiber Type	SMF
	Core Size	10 $\mu$ m
	Modal Bandwidth	-
	Distance	70 km (43.5 miles)
	DOM Support	Available
	Software required	Junos OS for EX Series switches, Release 9.4 or later



**Table 34: Optical Interface Support and Copper Interface Support for SFP Transceivers in 48-port SFP Line Cards Used in EX8200 Switches (*continued*)**

Ethernet Standard	Specifications	
100Base-LH (or 100Base-ZX)	Model Number	EX-SFP-IFE-LH
	Rate	100 Mbps
	Connector Type	LC
	Fiber Count	Dual
	Transmitter Wavelength	1310 nm
	Minimum Launch Power	-5 dBm
	Maximum Launch Power	0 dBm
	Minimum Receiver Sensitivity	-32 dBm
	Maximum Input Power	-8 dBm
	Fiber Type	SMF
	Core/Cladding Size	9/125 $\mu$ m
	Modal Bandwidth	-
	Distance	80 km (49.7 miles)
	DOM Support	Not available
	Software required	Junos OS for EX Series switches, Release 10.2 or later

- Related Topics**
- 8-port SFP+ Line Card in an EX8200 Switch on page 30
  - 40-port SFP+ Line Card in an EX8200 Switch on page 31
  - 48-port SFP Line Card in an EX8200 Switch on page 33
  - 48-port RJ-45 Line Card in an EX8200 Switch on page 34
  - Installing a Transceiver in an EX Series Switch on page 163
  - Removing a Transceiver from an EX Series Switch on page 222

## SFP+ Direct Attach Cables for EX Series Switches

Small form-factor pluggable plus transceiver (SFP+) direct attach copper cables, also known as Twinax cables, are suitable for in-rack connections between servers and

switches. They are suitable for short distances up to 7 m, making them ideal for highly cost-effective networking connectivity within a rack and between adjacent racks.

This topic describes:

- Cable Specifications on page 84
- Standards Supported by These Cables on page 87

## Cable Specifications

Juniper Networks SFP+ direct attach cables are available in four lengths:

- 1 m (3.3 ft)—Supported on EX3200, EX4200, EX4500, and EX8200 switches
- 3 m (9.9 ft)—Supported on EX3200, EX4200, EX4500, and EX8200 switches
- 5 m (16.4 ft)—Supported on EX3200, EX4200, and EX8200 switches
- 7 m (23 ft)—Supported on EX3200, EX4200, EX4500, and EX8200 switches



**NOTE:** When you use SFP+ direct attach cables with your EX Series switches, we recommend that you use only Juniper Networks SFP+ direct attach cables.

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The cables are hot-removable and hot-insertable: You can remove and replace them without powering off the switch or disrupting switch functions. A cable comprises a low-voltage cable assembly that connects directly into two SFP+ modules, one at each end of the cable. The cables use high-performance integrated duplex serial data links for bidirectional communication and are designed for data rates up to 10 Gbps.

Table 35 on page 85 describes the cable specifications.

Table 35: SFP+ Direct Attach Cable Specifications

Model	Specification	
EX-SFP-10GE-DAC-1m	Rate	10 Gbps full-duplex serial transmission
	Connector type	SFP+ passive Twinax cable assembly
	Supply voltage	3.3 V
	Power consumption (per end)	0.57 W
	Storage temperature	-40°C to 85°C
	Cable type	Twinax
	Wire AWG	30 AWG
	Minimum cable bend radius	1 in.
	Cable characteristic impedance	100 ohms
	Crosstalk between pairs	2% maximum
	Time delay	1.31 nsec/ft
	Length	1 m (3.3 ft)
	EX-SFP-10GE-DAC-3m	Rate
Connector type		SFP+ passive Twinax cable assembly
Supply voltage		3.3 V
Power consumption (per end)		0.57 W
Storage temperature		-40°C to 85°C
Cable type		Twinax
Wire AWG		30 AWG
Minimum cable bend radius		1 in.
Cable characteristic impedance		100 ohms
Crosstalk between pairs		2% maximum
Time delay		1.31 nsec/ft
Length		3 m (9.9 ft)

Table 35: SFP+ Direct Attach Cable Specifications (*continued*)

Model	Specification	
EX-SFP-10GE-DAC-5m	Rate	10 Gbps full-duplex serial transmission
	Connector type	SFP+ passive Twinax cable assembly
	Supply voltage	3.3 V
	Power consumption (per end)	0.57 W
	Storage temperature	-40°C to 85°C
	Cable type	Twinax
	Wire AWG	24 AWG
	Minimum cable bend radius	2 in.
	Cable characteristic impedance	100 ohms
	Crosstalk between pairs	2% maximum
	Time delay	1.31 nsec/ft
	Length	5 m (16.4 ft)
	EX-SFP-10GE-DAC-7m	Rate
Connector type		SFP+ passive Twinax cable assembly
Supply voltage		3.3 V
Power consumption (per end)		0.57 W
Storage temperature		-40°C to 85°C
Cable type		Twinax
Wire AWG		24 AWG
Minimum cable bend radius		2 in.
Cable characteristic impedance		100 ohms
Crosstalk between pairs		2% maximum
Time delay		1.31 nsec/ft
Length		7 m (23 ft)

## Standards Supported by These Cables

The cables comply with the following standards:

- SFP mechanical standard SFF-843—see <ftp://ftp.seagate.com/sff/SFF-8431.PDF>.
- Electrical interface standard SFF-8432—see <ftp://ftp.seagate.com/sff/SFF-8432.PDF>.
- SFP+ Multi-Source Alliance (MSA) standards

- Related Topics**
- Optical Interface Support in EX3200 and EX4200 Switches
  - Optical Interface Support in EX4500 Switches
  - Optical Interface Support in EX8200 Switches on page 60
  - Installing a Transceiver in an EX Series Switch on page 163
  - Removing a Transceiver from an EX Series Switch on page 222

## Grounding Cable and Lug Specifications for EX8200 Switches

For installations that require a separate grounding conductor to the chassis, the switch must be adequately grounded before power is connected to ensure proper operation and to meet safety and electromagnetic interference (EMI) requirements. To ground an EX8200 switch, connect a grounding cable to earth ground and then attach it to the chassis grounding points.



**CAUTION:** For installations that require a separate grounding conductor to the chassis, use the protective earthing terminal on the EX8200 switch chassis to connect to earth ground. Before switch installation begins, a licensed electrician must attach a cable lug to the grounding cables that you supply. See “Connecting Earth Ground to an EX Series Switch” on page 167. A cable with an incorrectly attached lug can damage the switch.

A pair of threaded inserts (PEM nuts) is provided on the right side towards the top rear corner of the EX8208 chassis for connecting the switch to earth ground. The grounding points fit UNC ¼-20 screws. The grounding points are spaced at 0.625 in. (15.86 mm).

Two pairs of threaded inserts (PEM nuts) are provided on the EX8216 chassis for connecting the switch to earth ground. The first pair is located on the right side towards the top rear corner of the chassis. The second pair is on the rear of chassis towards the right bottom corner of the chassis. Both pairs of grounding points fit UNC ¼-20 screws. The grounding points are spaced at 0.625 in. (15.86 mm).



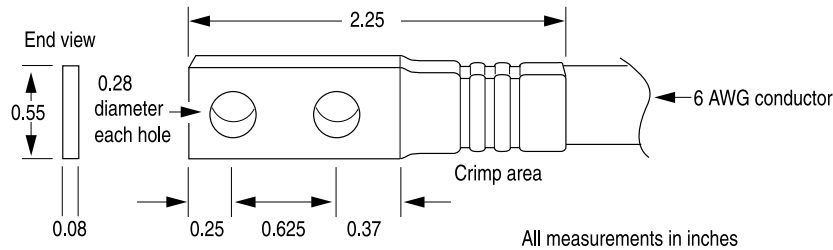
**NOTE:** EX8216 switches have two protective earthing terminals provided on the chassis. Only one of these protective earthing terminals needs to be permanently connected to earth ground. See Chassis Physical Specifications of an EX8216 Switch for the location of the protective earthing terminals.



**NOTE:** Grounding is provided to an AC-powered switch when you plug its power supplies into grounded AC power receptacles.

Figure 32 on page 88 shows the cable lug that attaches to the grounding cable in an EX8208 switch.

**Figure 32: Grounding Cable Lug For an EX8208 Switch**



The grounding cable that you provide for an EX8208 switch must be 6 AWG (13.3 mm<sup>2</sup>), minimum 60°C wire, or as permitted by the local code.

The grounding cable that you provide for an EX8216 switch must be 2 AWG (33.6 mm<sup>2</sup>), minimum 60°C wire, or as permitted by the local code.



**NOTE:** Two grounding lugs for an EX8216 switch are shipped with the chassis.



**WARNING:** The switch is pluggable type A equipment installed in a restricted-access location. It has a separate protective earthing terminal provided on the chassis in addition to the grounding pin of the power supply cord. This separate protective earthing terminal must be permanently connected to earth ground for installations that require a separate grounding conductor to the chassis.

**Related Topics**

- AC Power Supply in an EX8200 Switch on page 40
- DC Power Supply in an EX8200 Switch on page 48
- Connecting AC Power to an EX8200 Switch on page 173
- Connecting DC Power to an EX8200 Switch on page 175

## PART 2

# Planning for Switch Installation

- Site Preparation on page 91
- Rack and Cabinet Requirements on page 97
- Cable Requirements on page 105
- Planning Power Requirements on page 109





## CHAPTER 4

# Site Preparation

- Site Preparation Checklist for an EX8200 Switch on page 91
- General Site Guidelines for EX Series Switches on page 93
- Site Electrical Wiring Guidelines for EX Series Switches on page 94
- Environmental Requirements and Specifications for EX Series Switches on page 95

### Site Preparation Checklist for an EX8200 Switch

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The checklist in Table 36 on page 91 summarizes the tasks you need to perform to prepare a site for installing an EX8200 switch.

**Table 36: Site Preparation Checklist**

Item or Task	For More Information	Performed By	Date
<b>Environment</b>			
Verify that environmental factors such as temperature and humidity do not exceed switch tolerances.	"Environmental Requirements and Specifications for EX Series Switches" on page 95		
<b>Power</b>			
Measure distance between external power sources and switch installation site.			

Table 36: Site Preparation Checklist (*continued*)

Item or Task	For More Information	Performed By	Date
Calculate the power consumption and requirements.	<p>“AC Power Specifications for EX8200 Switches” on page 109</p> <p>“DC Power Specifications for EX8200 Switches” on page 110</p> <p>“Power Requirements for EX8208 Switch Components” on page 111</p> <p>Power Requirements for EX8216 Switch Components</p> <p>“Calculating Power Requirements for an EX8208 Switch” on page 114</p> <p>Calculating Power Requirements for an EX8216 Switch</p> <p>“Calculating the EX8200 Switch Fiber-Optic Cable Power Budget” on page 120</p> <p>“Calculating the EX8200 Switch Fiber-Optic Cable Power Margin” on page 121</p>		
<b>Rack or Cabinet</b>			
Select the type of rack or cabinet and verify that it meets the minimum requirements for the installation of the switch.	<p>“Rack Requirements for an EX8208 Switch” on page 97</p> <p>Rack Requirements for an EX8216 Switch</p> <p>“Cabinet Requirements and Specifications for an EX8208 Switch” on page 100</p> <p>Cabinet Requirements and Specifications for an EX8216 Switch</p>		
Plan rack or cabinet location, ensuring the required space clearances.	<p>“Clearance Requirements for Airflow and Hardware Maintenance for an EX8208 Switch” on page 101</p> <p>Clearance Requirements for Airflow and Hardware Maintenance for an EX8216 Switch</p>		

Table 36: Site Preparation Checklist (*continued*)

Item or Task	For More Information	Performed By	Date
Secure the rack or cabinet to the floor and building structure.	<p>"Rack Requirements for an EX8208 Switch" on page 97</p> <p>Rack Requirements for an EX8216 Switch</p> <p>"Cabinet Requirements and Specifications for an EX8208 Switch" on page 100</p> <p>Cabinet Requirements and Specifications for an EX8216 Switch</p>		

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### Cables

Plan the cable routing and management.

Acquire cables and connectors:

- Determine the number of cables needed based on your planned configuration.
- Ensure that the distance between hardware components to be connected allows for cable lengths to be within the specified maximum limits.

- 
- Related Topics**
- General Safety Guidelines and Warnings for EX Series Switches on page 263
  - Mounting an EX8208 Switch on a Rack or Cabinet on page 138
  - Mounting an EX8216 Switch on a Rack or Cabinet

## General Site Guidelines for EX Series Switches

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Efficient switch operation requires proper site planning and maintenance and proper layout of the equipment, rack or cabinet (if used), and wiring closet.

To plan and create an acceptable operating environment for your EX Series switch and prevent environmentally caused equipment failures:

- Keep the area around the chassis free from dust and conductive material, such as metal flakes.
- Follow prescribed airflow guidelines to ensure that the cooling system functions properly and that exhaust from other equipment does not blow into the intake vents of the switch.
- Follow the prescribed ESD prevention procedures to avoid damaging the equipment. Static discharge can cause components to fail completely or intermittently over time.
- Install the switch in a secure area, so that only authorized personnel can access the switch.

- Related Topics**
- Prevention of Electrostatic Discharge Damage on EX Series Switches on page 292
  - Clearance Requirements for Airflow and Hardware Maintenance for EX2200 Switches
  - Clearance Requirements for Airflow and Hardware Maintenance for EX3200 and EX4200 Switches
  - Clearance Requirements for Airflow and Hardware Maintenance for EX4500 Switches
  - Clearance Requirements for Airflow and Hardware Maintenance for an EX8208 Switch on page 101
  - Clearance Requirements for Airflow and Hardware Maintenance for an EX8216 Switch
  - Environmental Requirements and Specifications for EX Series Switches on page 95

## Site Electrical Wiring Guidelines for EX Series Switches

Table 37 on page 94 describes the factors you must consider while planning the electrical wiring at your site.



**WARNING:** It is particularly important to provide a properly grounded and shielded environment and to use electrical surge-suppression devices.

**Table 37: Site Electrical Wiring Guidelines**

Site Wiring Factor	Guidelines
Signaling limitations	<p>If your site experiences any of the following problems, consult experts in electrical surge suppression and shielding:</p> <ul style="list-style-type: none"> <li>• Improperly installed wires cause radio frequency interference (RFI).</li> <li>• Damage from lightning strikes occurs when wires exceed recommended distances or pass between buildings.</li> <li>• Electromagnetic pulses (EMPs) caused by lightning damages unshielded conductors and electronic devices.</li> </ul>
Radio frequency interference	<p>To reduce or eliminate radio frequency interference (RFI) from your site wiring, do the following:</p> <ul style="list-style-type: none"> <li>• Use twisted-pair cable with a good distribution of grounding conductors.</li> <li>• If you must exceed the recommended distances, use a high-quality twisted-pair cable with one ground conductor for each data signal when applicable.</li> </ul>

Table 37: Site Electrical Wiring Guidelines (*continued*)

Site Wiring Factor	Guidelines
Electromagnetic compatibility	<p>If your site is susceptible to problems with electromagnetic compatibility (EMC), particularly from lightning or radio transmitters, seek expert advice.</p> <p>Some of the problems caused by strong sources of electromagnetic interference (EMI) are:</p> <ul style="list-style-type: none"> <li>• Destruction of the signal drivers and receivers in the switch</li> <li>• Electrical hazards as a result of power surges conducted over the lines into the equipment</li> </ul>

- Related Topics**
- General Safety Guidelines and Warnings for EX Series Switches on page 263
  - General Electrical Safety Guidelines and Warnings for EX Series Switches on page 291
  - Prevention of Electrostatic Discharge Damage on EX Series Switches on page 292
  - Power Supply in EX2200 Switches
  - Power Supply in EX3200 and EX4200 Switches
  - AC Power Supply in EX4500 Switches
  - AC Power Supply in an EX8200 Switch on page 40
  - DC Power Supply in an EX8200 Switch on page 48

## Environmental Requirements and Specifications for EX Series Switches

The switch must be installed in a rack or cabinet housed in a dry, clean, well-ventilated, and temperature-controlled environment.

Ensure that these environmental guidelines are followed:

- The site must be as dust-free as possible, because dust can clog air intake vents and filters, reducing the efficiency of the switch cooling system.
- Maintain ambient airflow for normal switch operation. If the airflow is blocked or restricted, or if the intake air is too warm, the switch might overheat, leading to the switch temperature monitor shutting down the switch to protect the hardware components.

Table 38 on page 95 provides the required environmental conditions for normal switch operation.

Table 38: EX Series Switch Environmental Tolerances

Description	Tolerance
Altitude	No performance degradation to 10,000 feet (3048 meters)

Table 38: EX Series Switch Environmental Tolerances (*continued*)

Description	Tolerance
Relative humidity	Normal operation ensured in relative humidity range of 10% through 85%, noncondensing
Temperature	<ul style="list-style-type: none"> <li>EX2200, EX3200, EX4200, and EX4500 switches: Normal operation ensured in temperature range of 32° F through 113° F (0° C through 45° C)</li> <li>EX8208 and EX8216 switches: Normal operation ensured in temperature range of 32° F through 104° F (0° C through 40° C)</li> </ul>
Seismic	Complies with Zone 4 earthquake requirements as per GR-63, Issue 3.



**NOTE:** Install EX Series switches only in restricted areas, such as dedicated equipment rooms and equipment closets, in accordance with Articles 110–16, 110–17, and 110–18 of the National Electrical Code, ANSI/NFPA 70.

#### Related Topics

- Clearance Requirements for Airflow and Hardware Maintenance for EX2200 Switches
- Clearance Requirements for Airflow and Hardware Maintenance for EX3200 and EX4200 Switches
- Clearance Requirements for Airflow and Hardware Maintenance for EX4500 Switches
- Clearance Requirements for Airflow and Hardware Maintenance for an EX8208 Switch on page 101
- Clearance Requirements for Airflow and Hardware Maintenance for an EX8216 Switch

## CHAPTER 5

# Rack and Cabinet Requirements

- Rack Requirements for an EX8208 Switch on page 97
- Cabinet Requirements and Specifications for an EX8208 Switch on page 100
- Clearance Requirements for Airflow and Hardware Maintenance for an EX8208 Switch on page 101

### Rack Requirements for an EX8208 Switch

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You can mount EX8208 switches on four-post racks or two-post racks. See Figure 33 on page 99 and Figure 34 on page 99.

Rack requirements consist of:

- Rack type
- Mounting bracket hole spacing
- Rack size and strength
- Rack connection to the building structure

Table 39 on page 98 summarizes rack requirements and specifications for EX8208 switches.

Figure 33 on page 99 shows four-post rack installation. Figure 34 on page 99 shows two-post rack installation.



**NOTE:** To manage airflow in a hot-aisle-cold-aisle data center setup, you might want to use the customized rack solution for EX8200 switches offered by Chatsworth Products, Inc.

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Table 39: Rack Requirements and Specifications for an EX8208 Switch

Rack Requirement	Guidelines
Rack type and mounting bracket hole spacing	<p>Use a four-post rack or a two-post rack. You can mount the switch on any four-post or two-post rack that provides bracket holes or hole patterns spaced at 1 U (1.75 in./4.44 cm) increments and that meets the size and strength requirements specified in this table.</p> <p>A U is the standard rack unit defined in <i>Cabinets, Racks, Panels, and Associated Equipment</i> (document number EIA-310-D) published by the Electronics Industry Association (<a href="http://www.eia.org">http://www.eia.org</a>).</p> <p>You can stack three EX8208 switches in a four-post rack that has at least 42 U; if you install the optional power cord tray, a minimum of 45 U are required. You can stack three EX8208 switches in a two-post rack that has 45 U (installing the power cord tray is mandatory for two-post rack installations). In all cases, the rack must meet the strength requirements to support the weight.</p>
Rack size and strength	<ul style="list-style-type: none"> <li>• Ensure that the rack is a 19-in. rack as defined in <i>Cabinets, Racks, Panels, and Associated Equipment</i> (document number EIA-310-D) published by the Electronics Industry Association (<a href="http://www.eia.org">http://www.eia.org</a>).</li> <li>• Ensure that the rack is one of the following standard lengths: <ul style="list-style-type: none"> <li>• 23.62 in. (600 mm)</li> <li>• 30.0 in. (762 mm)</li> <li>• 21.5 in. (546 mm)</li> </ul> </li> <li>• Ensure that the rack rails are spaced widely enough to accommodate the EX8208 switch chassis' external dimensions of 24.25 in. (61.6 cm) height, 17.25 in. (43.815 cm) width, 20 in. (50.8 cm) depth. The outer edges of the front-mounting brackets extend the width to 19 in. (48.3 cm).</li> <li>• The EX8208 switch chassis height of 24.25 in. (61.6 cm) is approximately 14 U. If you install the power cord tray (optional for four-post rack installations, mandatory for two-post rack installations), the chassis and power cord tray consume 15 U.</li> <li>• The rack must be strong enough to support the weight of the fully configured switch. A fully configured EX8208 switch weighs up to 284 lb (130 kg). If you stack three fully configured EX8208 switches in one rack, that rack must support up to 852 lb (487 kg).</li> <li>• Ensure that the spacing of rails and adjacent racks allows for the proper clearance around the switch and rack as specified in "Clearance Requirements for Airflow and Hardware Maintenance for an EX8208 Switch" on page 101.</li> </ul>
Rack connection to the building structure	<ul style="list-style-type: none"> <li>• Secure the rack to the building structure.</li> <li>• If earthquakes are a possibility in your geographical area, secure the rack to the floor.</li> <li>• Secure the rack to the ceiling brackets as well as wall or floor brackets for maximum stability.</li> </ul>



Figure 33: Installing an EX8208 Switch in a Four-Post Rack

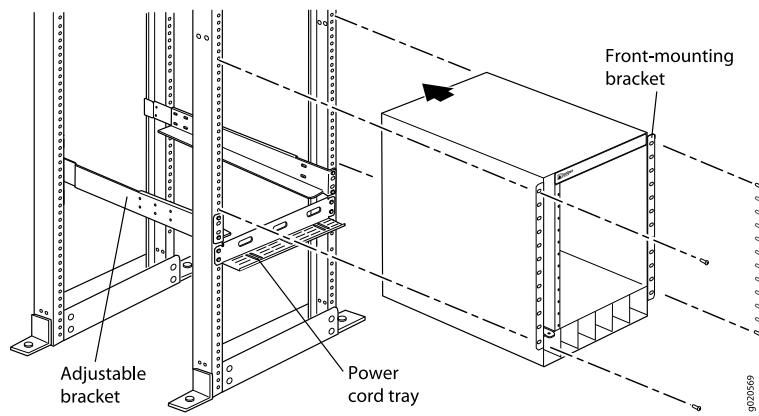
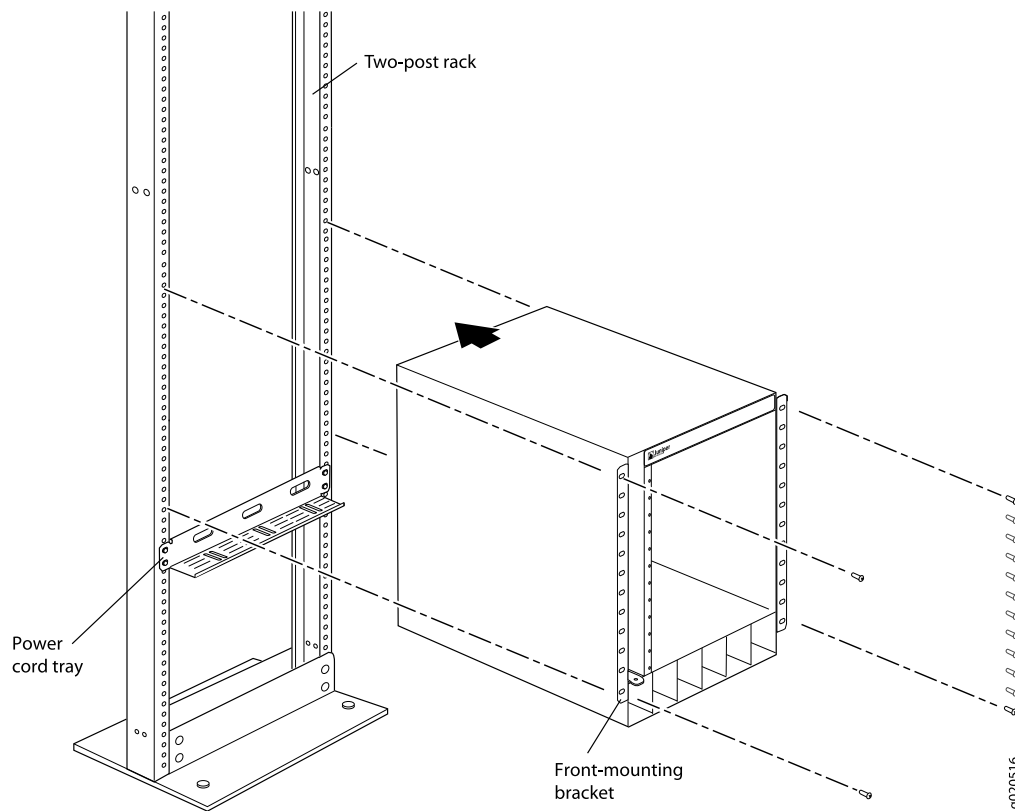


Figure 34: Installing an EX8208 Switch in a Two-Post Rack



- Related Topics**
- Rack-Mounting and Cabinet-Mounting Warnings for EX Series Switches on page 278
  - Cabinet Requirements and Specifications for an EX8208 Switch on page 100
  - Chassis Physical Specifications of an EX8208 Switch on page 9

## Cabinet Requirements and Specifications for an EX8208 Switch

You can mount an EX8208 switch on a cabinet that contains a 19-in. rack as defined in *Cabinets, Racks, Panels, and Associated Equipment* (document number EIA-310-D) published by the Electronics Industry Association (<http://www.eia.org>).

Cabinet requirements consist of:

- Cabinet size and clearance
- Cabinet airflow requirements

Table 40 on page 100 summarizes cabinet requirements and specifications for EX8208 switches.

**Table 40: Cabinet Requirements and Specifications for an EX8208 Switch**

Cabinet Requirement	Guidelines for the EX8208 Switch
Cabinet size and clearance	<ul style="list-style-type: none"> <li>• The minimum cabinet size for accommodating an EX8208 switch is 23.62 in. (60 cm) wide and 30.0 in. (76.2 cm) deep. Large cabinets improve airflow and reduce the chance of overheating. To accommodate a single EX8208 switch in a four-post rack, the cabinet must be at least 14 U high (or 15 U if you install the power cord tray, which is optional for the four-post rack). To accommodate a single EX8208 switch in a two-post rack, the cabinet must be at least 15 U high.  A U is the standard rack unit defined in <i>Cabinets, Racks, Panels, and Associated Equipment</i> (document number EIA-310-D) published by the Electronics Industry Association (<a href="http://www.eia.org">http://www.eia.org</a>).</li> <li>• With adequate cooling air and airflow clearance, you can stack three EX8208 switches in a cabinet with a four-post rack that has at least 42 U of usable vertical space. (45 U are required if you install the optional power cord tray.) You can stack three EX8208 switches in a cabinet with a two-post rack that has at least 45 U of usable vertical space (for two-post rack installations, installing the power cord tray is mandatory). In all cases, the rack must meet the strength requirements to support the weight.</li> <li>• The minimum total clearance inside the cabinet is 29.2 in. (74.17 cm) between the inside of the front door and the inside of the rear door.</li> </ul>

Table 40: Cabinet Requirements and Specifications for an EX8208 Switch (*continued*)

Cabinet Requirement	Guidelines for the EX8208 Switch
Cabinet airflow requirements	<p>When you mount the switch on a cabinet, ensure that ventilation through the cabinet is sufficient to prevent overheating. Consider the following requirements list when planning for chassis cooling:</p> <ul style="list-style-type: none"> <li>• Ensure that the cool air supply you provide through the cabinet adequately dissipates the thermal output of the switch (or switches).</li> <li>• Ensure that the cabinet allows the chassis hot exhaust air to exit the cabinet without recirculating into the switch. An open cabinet (without a top or doors) that employs hot air exhaust extraction from the top allows the best airflow through the chassis. If the cabinet contains a top or doors, perforations in these elements assist with removing the hot air exhaust. For an illustration of chassis airflow, see “Clearance Requirements for Airflow and Hardware Maintenance for an EX8208 Switch” on page 101.</li> <li>• The switch fans exhaust hot air through the right side of the chassis (the left side when you face the front of the chassis, where the fan tray slides in). Install the switch in the cabinet in a way that maximizes the open space on the fan tray side of the chassis. This maximizes the clearance for critical airflow.</li> <li>• Route and dress all cables to minimize the blockage of airflow to and from the chassis.</li> <li>• Ensure that the spacing of rails and adjacent racks allows for the proper clearance around the switch and rack as specified in “Clearance Requirements for Airflow and Hardware Maintenance for an EX8208 Switch” on page 101.</li> </ul>

- Related Topics**
- Rack-Mounting and Cabinet-Mounting Warnings for EX Series Switches on page 278
  - Rack Requirements for an EX8208 Switch on page 97
  - Chassis Physical Specifications of an EX8208 Switch on page 9

## Clearance Requirements for Airflow and Hardware Maintenance for an EX8208 Switch

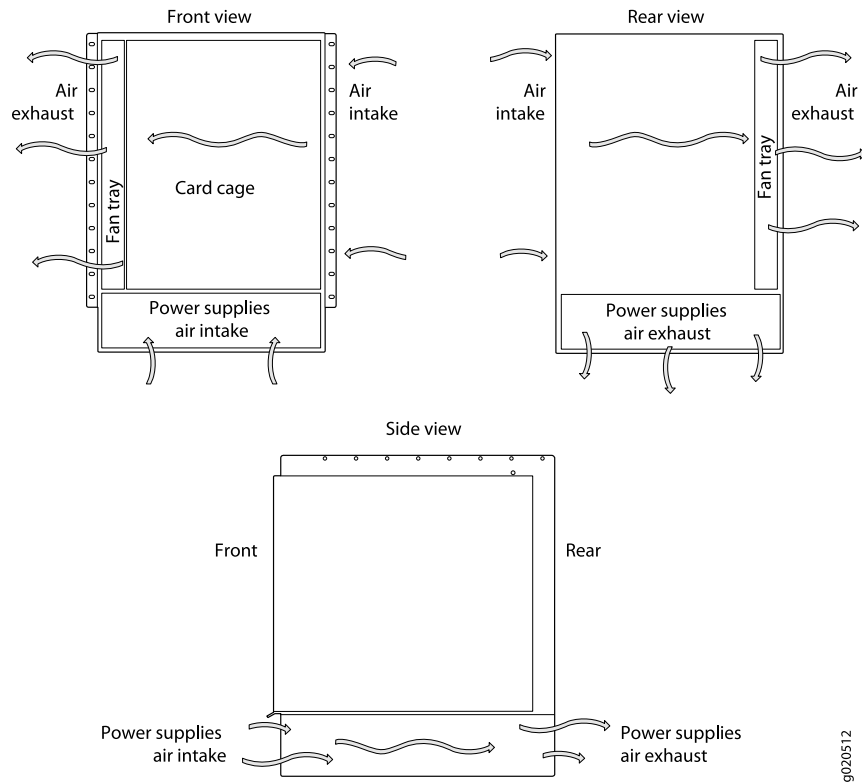
When planning the site for installing an EX8208 switch, you must allow sufficient clearance around the switch.



**NOTE:** To manage airflow in a hot-aisle--cold-aisle data center setup, you might want to use the customized rack solution for EX8200 switches offered by Chatsworth Products, Inc.

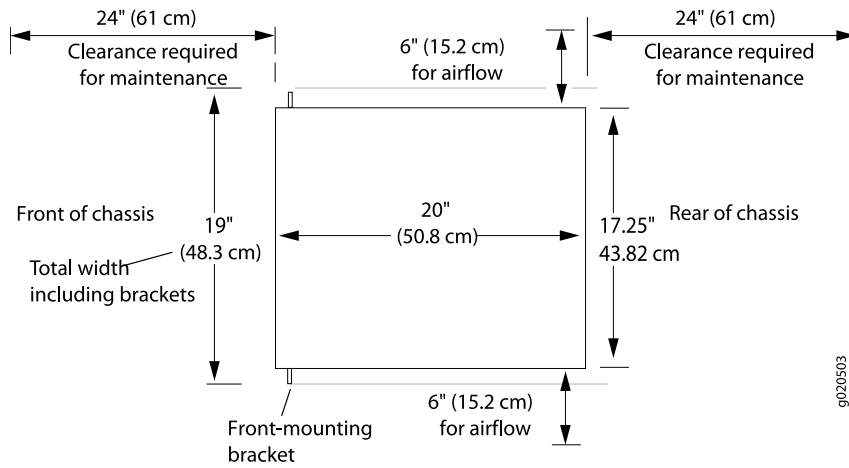
- Allow at least 6 in. (15.2 cm) of clearance on each side of the chassis. For the cooling system to function properly, the airflow around the chassis must be unrestricted. See Figure 35 on page 102.

Figure 35: Airflow Through the EX8208 Switch Chassis



- If you are mounting the switch on a rack or cabinet along with other equipment, ensure that the exhaust from other equipment does not blow into the intake vents of the chassis.
- Leave at least 24 in. (61 cm) both in front of and behind the switch. Allow at least 6 in. (15.2 cm) of clearance on each side of the chassis. Leave adequate space at the front of the switch for service personnel to remove and install hardware components. NEBS GR-63 recommends that you allow at least 30 in. (76.2 cm) in front of the rack or cabinet and 24 in. (61 cm) behind the rack or cabinet. See Figure 36 on page 103.

**Figure 36: Clearance Requirements for Airflow and Hardware Maintenance for an EX8208 Switch Chassis**



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- Related Topics**
- Cabinet Requirements and Specifications for an EX8208 Switch on page 100
  - Rack Requirements for an EX8208 Switch on page 97
  - Rack-Mounting and Cabinet-Mounting Warnings for EX Series Switches on page 278
  - Cooling System and Airflow in an EX8208 Switch on page 53



## CHAPTER 6

# Cable Requirements

- Cables Connecting the EX8200 Switch to Management Devices on page 105
- Understanding EX8200 Switch Fiber-Optic Cable Signal Loss, Attenuation, and Dispersion on page 106

### Cables Connecting the EX8200 Switch to Management Devices

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Table 41 on page 105 lists the specifications for the cables that connect the Switch Fabric and Routing Engine (SRE) module (in an EX8208 switch) or the Routing Engine (RE) module (in an EX8216 switch) to a management device.

**Table 41: Cable Specifications for Switch-to-Management-Device Connections**

Port on SRE Module or RE Module	Cable Specification	Cable/Wire Supplied	Maximum Length	Switch Receptacle
Console (CON) port (9600 baud)	RS-232 (EIA-232) serial cable	One 6-foot (1.83-meter) length with RJ-45/DB-9 connectors	6 feet (1.83 meters)	RJ-45
Management (MGMT) Ethernet port (10/100/1000)	Category 5 cable or equivalent suitable for 1000Base-T operation	One 15-foot (4.57-meter) length with RJ-45 connectors	328 feet (100 meters)	RJ-45 autosensing

- Related Topics**
- Connecting an EX Series Switch to a Management Console on page 181
  - Connecting an EX Series Switch to a Network for Out-of-Band Management on page 187

## Understanding EX8200 Switch Fiber-Optic Cable Signal Loss, Attenuation, and Dispersion

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To determine the power budget and power margin needed for fiber-optic connections, you need to understand how signal loss, attenuation, and dispersion affect transmission. Juniper Networks EX8200 Ethernet Switches use various types of network cable, including multimode and single-mode fiber-optic cable.

- Signal Loss in Multimode and Single-Mode Fiber-Optic Cable on page 106
- Attenuation and Dispersion in Fiber-Optic Cable on page 106

### Signal Loss in Multimode and Single-Mode Fiber-Optic Cable

Multimode fiber is large enough in diameter to allow rays of light to reflect internally (bounce off the walls of the fiber). Interfaces with multimode optics typically use LEDs as light sources. However, LEDs are not coherent light sources. They spray varying wavelengths of light into the multimode fiber, which reflects the light at different angles. Light rays travel in jagged lines through a multimode fiber, causing signal dispersion. When light traveling in the fiber core radiates into the fiber cladding (layers of lower refractive index material in close contact with a core material of higher refractive index), higher-order mode loss (HOL) occurs. Together, these factors reduce the transmission distance of multimode fiber compared to that of single-mode fiber.

Single-mode fiber is so small in diameter that rays of light reflect internally through one layer only. Interfaces with single-mode optics use lasers as light sources. Lasers generate a single wavelength of light, which travels in a straight line through the single-mode fiber. Compared to multimode fiber, single-mode fiber has a higher bandwidth and can carry signals for longer distances. It is consequently more expensive.

For information about the maximum transmission distance and supported wavelength range for the types of single-mode and multimode fiber-optic cables that are connected to line cards on the EX8200 switches, see “Optical Interface Support in EX8200 Switches” on page 60. Exceeding the maximum transmission distances can result in significant signal loss, which causes unreliable transmission.

### Attenuation and Dispersion in Fiber-Optic Cable

An optical data link functions correctly provided that modulated light reaching the receiver has enough power to be demodulated correctly. *Attenuation* is the reduction in strength of the light signal during transmission. Passive media components such as cables, cable splices, and connectors cause attenuation. Although attenuation is significantly lower for optical fiber than for other media, it still occurs in both multimode and single-mode transmission. An efficient optical data link must transmit enough light to overcome attenuation.

*Dispersion* is the spreading of the signal over time. The following two types of dispersion can affect signal transmission through an optical data link:

- Chromatic dispersion, which is the spreading of the signal over time caused by the different speeds of light rays.



- Modal dispersion, which is the spreading of the signal over time caused by the different propagation modes in the fiber.

For multimode transmission, modal dispersion, rather than chromatic dispersion or attenuation, usually limits the maximum bit rate and link length. For single-mode transmission, modal dispersion is not a factor. However, at higher bit rates and over longer distances, chromatic dispersion limits the maximum link length.

An efficient optical data link must have enough light to exceed the minimum power that the receiver requires to operate within its specifications. In addition, the total dispersion must be within the limits specified for the type of link in Telcordia Technologies document GR-253-CORE (Section 4.3) and International Telecommunications Union (ITU) document G.957.

When chromatic dispersion is at the maximum allowed, its effect can be considered as a power penalty in the power budget. The optical power budget must allow for the sum of component attenuation, power penalties (including those from dispersion), and a safety margin for unexpected losses.

**Related Topics**

- Calculating the EX8200 Switch Fiber-Optic Cable Power Budget on page 120
- Calculating the EX8200 Switch Fiber-Optic Cable Power Margin on page 121
- Optical Interface Support in EX8200 Switches on page 60



## CHAPTER 7

# Planning Power Requirements

- AC Power Specifications for EX8200 Switches on page 109
- DC Power Specifications for EX8200 Switches on page 110
- Power Requirements for EX8208 Switch Components on page 111
- AC Power Cord Specifications for an EX8200 Switch on page 112
- Calculating Power Requirements for an EX8208 Switch on page 114
- Calculating the EX8200 Switch Fiber-Optic Cable Power Budget on page 120
- Calculating the EX8200 Switch Fiber-Optic Cable Power Margin on page 121

### AC Power Specifications for EX8200 Switches

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EX8200 switches can use either AC or DC power supplies.

Table 42 on page 109 lists the AC power specifications for a 2000 W power supply used in EX8200 switches.

**Table 42: Power Specifications for a 2000 W AC Power Supply in an EX8200 Switch**

Item	Specifications
AC input voltage	Operating range: <ul style="list-style-type: none"><li>• Low-voltage line—100–120 VAC</li><li>• High-voltage line—200–240 VAC</li></ul>
AC input line frequency	50–60 Hz
AC input current rating	<ul style="list-style-type: none"><li>• Low-voltage line—13.8 A</li><li>• High-voltage line—12 A</li></ul>
AC output power	<ul style="list-style-type: none"><li>• Low-voltage line—1200 W</li><li>• High-voltage line—2000 W</li></ul>

Table 43 on page 110 lists the AC power specifications for a 3000 W power supply used in EX8200 switches.

Table 43: Power Specifications for a 3000 W AC Power Supply in an EX8200 Switch

Item	Specifications
AC input voltage	Operating range: <ul style="list-style-type: none"> <li>High-voltage line—200–240 VAC</li> </ul> NOTE: Low-voltage line input is not supported for 3000 W AC power supplies on the EX8216 switch.
AC input line frequency	50–60 Hz
AC input current rating	<ul style="list-style-type: none"> <li>High-voltage line—16 A</li> </ul>
AC output power	<ul style="list-style-type: none"> <li>High-voltage line—3000 W</li> </ul>

- Related Topics**
- AC Power Supply in an EX8200 Switch on page 40
  - AC Power Supply LEDs in an EX8200 Switch on page 46
  - AC Power Cord Specifications for an EX8200 Switch on page 112

## DC Power Specifications for EX8200 Switches

Table 44 on page 110 lists the power specifications for the 3000 W DC power supply used in EX8216 switches.

Table 44: Power Specifications for a 3000 W DC Power Supply Used in an EX8216 Switch

Item	Specifications
DC input voltage	<ul style="list-style-type: none"> <li>Minimum operating voltage: –40 VDC</li> <li>Nominal operating voltage: –48 VDC</li> <li>Operating voltage range: –40 VDC through –72 VDC</li> </ul> NOTE: If the input voltage from the DC power source drops below –37.5 VDC through –39.5 VDC, the switching platform automatically shuts down. During automatic shutdown, the circuit remains active. When the input voltage returns to –43 VDC through –44 VDC, the switch automatically starts up again and the system returns to normal operation within 30 minutes. No operator intervention is required.
DC input current rating	75 A maximum at nominal operating voltage (–48 VDC) for each input terminal.
Output power	3000 W
Internal Fuse Protection	100 A

Table 45 on page 111 lists the power specifications for the 2000 W DC power supply used in EX8208 switches.

Table 45: Power Specifications for a 2000 W DC Power Supply Used in an EX8208 Switch

Item	Specifications
DC input voltage	<ul style="list-style-type: none"> <li>Minimum operating voltage: –40 VDC</li> <li>Nominal operating voltage: –48 VDC</li> <li>Operating voltage range: –40 VDC through –72 VDC</li> </ul> <p>NOTE: If the input voltage from the DC power source drops below –37.5 VDC through –39.5 VDC, the switching platform automatically shuts down. During automatic shutdown, the circuit remains active. When the input voltage returns to –43 VDC through –44 VDC, the switch automatically starts up again and the system returns to normal operation within 30 minutes. No operator intervention is required.</p>
DC input current rating	50 A maximum at nominal operating voltage (–48 VDC) for each input terminal.
Output power	2000 W
Internal Fuse Protection	100 A

- Related Topics**
- DC Power Supply in an EX8200 Switch on page 48
  - DC Power Supply LEDs in an EX8200 Switch on page 50

## Power Requirements for EX8208 Switch Components

Table 46 on page 111 lists the power requirements for different hardware components of an EX8208 switch under typical voltage conditions.

Table 46: EX8208 Switch Component Power Requirements

Components	Power Requirements (Watts)
Fan tray	<ul style="list-style-type: none"> <li>• 300 W (at normal fan speed)</li> <li>• 1100 W (at maximum fan speed)</li> </ul>
Switch Fabric and Routing Engine (SRE) module	200 W
Switch Fabric (SF) module	100 W
8-port SFP+ line card (including optical transceivers)	450 W
40-port SFP+ line card (including optical transceivers)	550 W
48-port SFP line card (including optical transceivers)	330 W
48-port RJ-45 line card	350 W

- Related Topics**
- AC Power Supply in an EX8200 Switch on page 40
  - DC Power Supply in an EX8200 Switch on page 48

- Calculating Power Requirements for an EX8208 Switch on page 114

## AC Power Cord Specifications for an EX8200 Switch

Each AC power supply has a single AC appliance inlet located on the power supply that requires a dedicated AC power feed. Most sites distribute power through a main conduit that leads to frame-mounted power distribution panels, one of which can be located at the top of the rack that houses the switch. An AC power cord connects each power supply to the power distribution panel.

Each detachable AC power cord is 2.5 meters (approximately 8 feet) long. The appliance coupler at the female end of the cord inserts into the AC appliance inlet on the faceplate of the AC power supply. The coupler type is C19 as described by the International Electrotechnical Commission (IEC) standard 60320. The plug at the male end of the power cord fits into the power source outlet that is standard for your geographical location.



**NOTE:** In North America, AC power cords must not exceed 4.5 meters (approximately 15 feet) in length, to comply with National Electrical Code (NEC) Sections 400-8 (NFPA 75, 5-2.2) and 210-52 and Canadian Electrical Code (CEC) Section 4-010(3). The cords shipped with the switch are in compliance.

Table 47 on page 112 lists the AC power cord specifications for an EX8200 switch for the countries and regions listed in the table.

**Table 47: AC Power Cord Specifications for an EX8200 Switch**

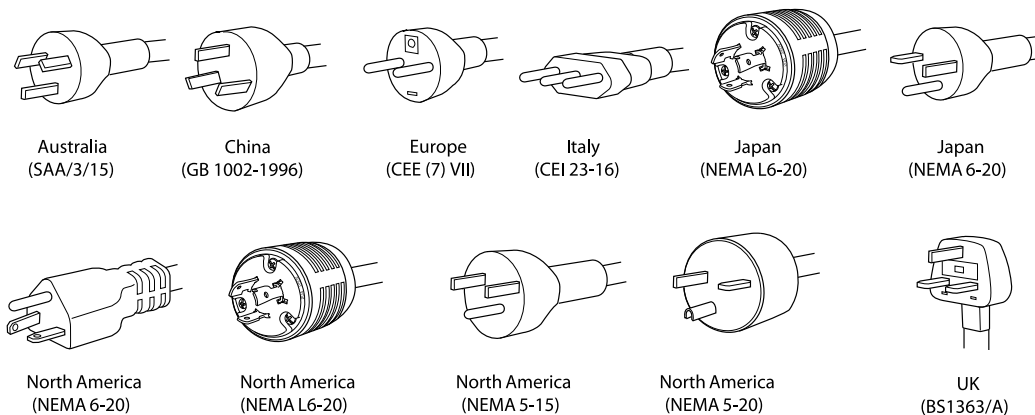
Country/Region	Electrical Specifications	Plug Standards
Australia	250 VAC, 15 A, 50 Hz	AS/NZS 3112
China	250 VAC, 16 A, 50 Hz	GB 1002
Europe (except Italy, Switzerland, and United Kingdom)	250 VAC, 16 A, 50 Hz	CEE (7) VII
Italy	250 VAC, 16 A, 50 Hz	CEI 23-16
Japan	250 VAC, 16 A, 50 Hz	NEMA 6-20 NEMA L6-20

Table 47: AC Power Cord Specifications for an EX8200 Switch (continued)

Country/Region	Electrical Specifications	Plug Standards
North America	250 VAC, 16 A, 50 Hz	<ul style="list-style-type: none"> <li>NEMA 6-20</li> <li>NEMA L6-20</li> </ul>
	125 VAC, 15 A, 50 Hz	<ul style="list-style-type: none"> <li>NEMA 5-15</li> </ul> <p>NOTE: Only for use with 2000 W AC power supply.</p>
	125 VAC, 20 A, 50 Hz	<ul style="list-style-type: none"> <li>NEMA 5-20</li> </ul> <p>NOTE: Only for use with 2000 W AC power supply.</p>
Switzerland	250 VAC, 16 A, 50 Hz	SEV 1011 SEV 5934/2
United Kingdom	250 VAC, 13 A, 50 Hz	BS 1363/A

Figure 37 on page 113 shows the plug on the power cord for each country and region listed in Table 47 on page 112.

Figure 37: AC Plug Types



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CAUTION: AC power cords for EX8200 switches are intended for use with this switch only and not for any other use.

#### Power Cable Warning (Japanese)

WARNING: The attached power cable is only for this product. Do not use the cable for another product.

### 注意

付属の電源コードセットはこの製品専用です。  
他の電気機器には使用しないでください。

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CAUTION: Power cords must not block access to switch components. We recommend that you route all AC power cord cables through the power cord tray provided with the switch.



WARNING: The switch is pluggable type A equipment installed in a restricted-access location. It has a separate protective earthing terminal provided on the chassis in addition to the grounding pin of the power supply cord. This separate protective earth terminal must be permanently connected to earth ground. See “Connecting Earth Ground to an EX Series Switch” on page 167.

#### Related Topics

- AC Power Supply in an EX8200 Switch on page 40
- AC Power Electrical Safety Guidelines for EX Series Switches on page 294
- AC Power Disconnection Warning for EX Series Switches on page 295
- General Electrical Safety Guidelines and Warnings for EX Series Switches on page 291
- Connecting AC Power to an EX8200 Switch on page 173

## Calculating Power Requirements for an EX8208 Switch

Use the information in this topic to calculate power consumption, system thermal output, and number of power supplies required for different EX8208 switch configurations.

Before you begin these calculations:

- Ensure you understand the different switch configurations. See “EX8208 Switch Configurations” on page 6.
- Ensure that you know the power requirements of different switch components. See “Power Requirements for EX8208 Switch Components” on page 111.



This topic describes these tasks:

- Calculating the Power Consumption of Your EX8208 Switch Configuration on page 115
- Calculating System Thermal Output for Your EX8208 Switch Configuration on page 116
- Calculating the Number of Power Supplies Required for Your EX8208 Switch Configuration on page 117

## Calculating the Power Consumption of Your EX8208 Switch Configuration

Use the following procedure to determine the maximum power you need to supply to the switch. To calculate maximum system power consumption, you first determine the combined maximum internal power requirements of all the switch components and then divide this result by the power supply efficiency.

To calculate maximum system power consumption:

1. Determine the maximum power consumption of the base chassis components (that is, the components other than the line cards):
  - Use Table 48 on page 115 if your switch is configured for N+1 power redundancy or if your switch is configured for N+N power redundancy and is running Junos OS Release 10.1 or earlier.
  - Use Table 49 on page 116 only if your switch is running Junos OS Release 10.2 or later and power management is configured for N+N power redundancy.



**NOTE:** In Junos OS Release 10.2 or later, if power management is configured for N+N redundancy, the maximum fan speed is lowered, reducing the chassis' maximum power consumption.

**Table 48: Chassis Power Consumption for N+1 Configurations and for N+N Configurations Running Junos OS Release 10.1 or Earlier**

Chassis Component	Base Configuration	Redundant Configuration
Fan tray	1100 W	1100 W
Switch Fabric and Routing Engine (SRE) module	200 W	200 W
Second SRE module	—	200 W
Switch Fabric module	100 W	100 W
<b>Total</b>	<b>1400 W</b>	<b>1600 W</b>

**Table 49: Chassis Power Consumption for N+N Configurations Running Junos OS Release 10.2 or Later**

Chassis Component	Base Configuration	Redundant Configuration
Fan tray	700 W	700 W
SRE module	200 W	200 W
SRE module	—	200 W
SF module	100 W	100 W
<b>Total</b>	<b>1000 W</b>	<b>1200 W</b>

- Calculate the maximum internal power consumption of the entire switch by adding in the power requirements of each line card.

For example, for a switch fully loaded with 8-port SFP+ line cards and using N+1 power redundancy, the maximum internal power consumption:

$$\begin{aligned}
 &= (\text{chassis watts}) + 8 (\text{8-port SFP+ line card watts}) \\
 &= (1600 \text{ W} + 8 (450 \text{ W})) \\
 &= (1600 \text{ W} + 3600 \text{ W}) \\
 &= 5200 \text{ W}
 \end{aligned}$$

- Calculate the maximum system power consumption by dividing the maximum internal power consumption by the efficiency of the power supply. This accounts for the loss of energy within the power supply.



**NOTE:** The efficiency of a 2000 W AC power supply is approximately 90 percent when input is high-voltage line (200–240 VAC).

The efficiency of a 2000 W AC power supply is approximately 87 percent when input is low-voltage line (100–120 VAC).

For example, for a switch fully loaded with 8-port SFP+ line cards and using N+1 power redundancy with high-voltage line input, the maximum system power consumption:

$$\begin{aligned}
 &= (\text{maximum internal power consumption}) / (\text{power supply efficiency}) \\
 &= (5200 \text{ W}) / (0.90) \\
 &= 5778 \text{ W}
 \end{aligned}$$

## Calculating System Thermal Output for Your EX8208 Switch Configuration

Use the following procedure to calculate the system thermal output in British thermal units (BTU) per hour for your switch configuration.

To calculate the system thermal output:

1. Determine the maximum system power consumption of your switch in watts. See “Calculating the Power Consumption of Your EX8208 Switch Configuration” on page 115 for how to do so.
2. Multiply the maximum system power consumption by 3.41.

For example, for a switch fully loaded with 8-port SFP+ line cards and using N+1 power redundancy with high-voltage line input, the system thermal output:

$$\begin{aligned} &= (\text{maximum system power consumption}) \times (3.41) \\ &= (5778 \text{ W}) \times (3.41) = \\ &= 19,703 \text{ BTU/hr} \end{aligned}$$



NOTE: Using the maximum system power consumption values to calculate the system thermal output often results in overprovisioning the cooling systems. Typical power consumption is about one-third lower than these calculated values.

### Calculating the Number of Power Supplies Required for Your EX8208 Switch Configuration

Use this procedure to calculate the number of power supplies required by your switch configuration. The required power configuration for EX8208 switches is N+1. You can optionally configure your switch for N+N configuration. For example, you might want dual power feed redundancy with AC power supplies, which requires an N+N configuration.

To calculate the number of power supplies required for your switch configuration:

1. Determine the power requirement of the base chassis (that is, the combined power requirements of the fan tray, SRE module or modules, and the SF module) by consulting Table 50 on page 118.

The watt values shown in Table 50 on page 118 are the amount of power reserved by power management for the chassis in its power budget. It uses these values when calculating used and available power and when determining whether sufficient power exists to meet N, N+1, or N+N requirements.

Starting with Junos OS Release 10.2, when power management is configured for N+N power redundancy, it reserves less power for the chassis so that more power is available for line cards.

**Table 50: Power Reserved for the Chassis**

	Junos OS Release 10.1 or Earlier	Junos OS Release 10.2 or Later
<b>N+1 Configuration</b>	1600 W	1600 W
<b>N+N Configuration</b>	1600 W	1200 W



**NOTE:** The amount of power that power management reserves for the chassis is a set value that does not vary depending on chassis components installed. The reserved power is the same for base and redundant configurations and for switches that do not have all base chassis components installed.

2. To the power reserved for the chassis, add the power requirements of the line cards.

For line card power requirements, refer to “Power Requirements for EX8208 Switch Components” on page 111.

For example, for a switch fully loaded with 8-port SFP+ line cards and using N+1 power redundancy, the total power requirement:

$$\begin{aligned}
 &= \text{reserved chassis power} + 8 \text{ (8-port SFP + line cards)} \\
 &= 1600 \text{ W} + 8 \text{ (450) W} \\
 &= 1600 \text{ W} + 3600 \text{ W} \\
 &= 5200 \text{ W}
 \end{aligned}$$

For a switch fully loaded with 8-port SFP+ line cards, using N+N power redundancy, and running Junos OS Release 10.2, the total power requirement:

$$\begin{aligned}
 &= \text{reserved chassis power} + 8 \text{ (8-port SFP + line cards)} \\
 &= 1200 \text{ W} + 8 \text{ (450) W} \\
 &= 1200 \text{ W} + 3600 \text{ W} \\
 &= 4800 \text{ W}
 \end{aligned}$$

3. Calculate the number of power supplies (N) required to meet the total power requirement by dividing the total power requirement by the output wattage of one power supply and then rounding up.



NOTE: If the input is high-voltage line (200–220 VAC), the output wattage of a 2000 W AC power supply is 2000 W.

If the input is low-voltage line (100–120 VAC), the output wattage of a 2000 W AC power supply is 1200 W.

For example, for a switch fully loaded with 8-port SFP+ line cards and using N+1 power redundancy with high-voltage line input, the required power supplies (N):

$$\begin{aligned}
 &= (\text{total power requirement}) / (\text{output wattage of power supply}) \\
 &= (5200 \text{ W}) / (2000 \text{ W}) \\
 &= 2.6 \\
 &= 3 \text{ (rounded up)}
 \end{aligned}$$

For a switch fully loaded with 8-port SFP+ line cards, using N+N power redundancy with high-voltage line input, and running Junos OS Release 10.2, the required power supplies (N):

$$\begin{aligned}
 &= (\text{total power requirement}) / (\text{output wattage of power supply}) \\
 &= (4800 \text{ W}) / (2000 \text{ W}) \\
 &= 2.4 \\
 &= 3 \text{ (rounded up)}
 \end{aligned}$$

4. Add the number of power supplies needed to achieve the required power redundancy:
  - To achieve N+1 power redundancy, add a single power supply.

For example, for a switch fully loaded with 8-port SFP+ line cards and using high-voltage line input, the total number of power supplies:

$$\begin{aligned}
 &= N + 1 \\
 &= 3 + 1 \\
 &= 4
 \end{aligned}$$

- To achieve N+N power redundancy, add N power supplies.

For example, for a switch fully loaded with 8-port SFP+ line cards and using high-voltage line input, the total number of power supplies:

$$\begin{aligned}
 &= N + N \\
 &= 3 + 3 \\
 &= 6
 \end{aligned}$$



NOTE: We recommend that you maintain N +1 or N+N power supplies in your switch at all times. Replace failed power supplies immediately to prevent unexpected failures. Power management raises a minor alarm if the number of online power supplies in your switch is less than the number required to maintain the configured power redundancy (N+1 in Junos OS Release 10.1 or earlier; N+1 or N+N in Junos OS Release 10.2 or later). If the problem is not corrected in 5 minutes, a major alarm is issued.

Power management raises a major alarm if the number of online power supplies in your switch is less than N power supplies. If your switch is running Junos OS Release 10.1 or earlier, all line cards are powered off. If your switch is running Junos OS Release 10.2 or later, power management provides power to line cards in priority order until power is exhausted. The remaining line cards are powered off.

If a new line card is installed in an operational switch, power management does not power on the line card if the increased power demand exceeds the total available power, including redundant power. If redundant power is used to power on the line card, a minor alarm is raised, which becomes a major alarm in 5 minutes if the condition is not corrected.

- Related Topics**
- AC Power Supply in an EX8200 Switch on page 40
  - DC Power Supply in an EX8200 Switch on page 48
  - Understanding Power Management on EX Series Switches

## Calculating the EX8200 Switch Fiber-Optic Cable Power Budget

Calculate the link's power budget when planning fiber-optic cable layout and distances to ensure that fiber-optic connections have sufficient power for correct operation. The power budget is the maximum amount of power the link can transmit. When you calculate the power budget, you use a worst-case analysis to provide a margin of error, even though all the parts of an actual system do not operate at the worst-case levels.

To calculate the worst-case estimate for fiber-optic cable power budget ( $P_B$ ) for the link:

1. Determine values for the link's minimum transmitter power ( $P_T$ ) and minimum receiver sensitivity ( $P_R$ ). For example, here, ( $P_T$ ) and ( $P_R$ ) are measured in decibels, and decibels are referred to one milliwatt (dBm).

$$P_T = -15 \text{ dBm}$$

$$P_R = -28 \text{ dBm}$$



NOTE: See the specifications for your transmitter and receiver to find the minimum transmitter power and minimum receiver sensitivity.

- Calculate the power budget ( $P_b$ ) by subtracting ( $P_r$ ) from ( $P_t$ ):  

$$-15 \text{ dBm} - (-28 \text{ dBm}) = 13 \text{ dBm}$$

- Related Topics**
- Calculating the EX8200 Switch Fiber-Optic Cable Power Margin on page 121
  - Optical Interface Support in EX8200 Switches on page 60
  - Understanding EX8200 Switch Fiber-Optic Cable Signal Loss, Attenuation, and Dispersion on page 106

## Calculating the EX8200 Switch Fiber-Optic Cable Power Margin

Calculate the link's power margin when planning fiber-optic cable layout and distances to ensure that fiber-optic connections have sufficient signal power to overcome system losses and still satisfy the minimum input requirements of the receiver for the required performance level. The power margin ( $P_m$ ) is the amount of power available after attenuation or link loss (LL) has been subtracted from the power budget ( $P_b$ ).

When you calculate the power margin, you use a worst-case analysis to provide a margin of error, even though all the parts of an actual system do not operate at worst-case levels. A power margin ( $P_m$ ) greater than zero indicates that the power budget is sufficient to operate the receiver and that it does not exceed the maximum receiver input power. This means the link will work. A ( $P_m$ ) that is zero or negative indicates insufficient power to operate the receiver. See the specification for your receiver to find the maximum receiver input power.

Before you begin to calculate the power margin:

- Calculate the power budget. See “Calculating the EX8200 Switch Fiber-Optic Cable Power Budget” on page 120.

To calculate the worst-case estimate for the power margin ( $P_m$ ) for the link:

- Determine the maximum value for link loss (LL) by adding estimated values for applicable link-loss factors—for example, use the sample values for various factors as provided in Table 51 on page 121 (here, the link is 2 km long and multimode, and the ( $P_b$ ) is 13 dBm):

**Table 51: Estimated Values for Factors Causing Link Loss**

Link-Loss Factor	Estimated Link-Loss Value	Sample (LL) Calculation Values
Higher-order mode losses (HOL)	<ul style="list-style-type: none"> <li>Multimode—0.5 dBm</li> <li>Single mode—None</li> </ul>	<ul style="list-style-type: none"> <li>0.5 dBm</li> <li>0 dBm</li> </ul>
Modal and chromatic dispersion	<ul style="list-style-type: none"> <li>Multimode—None, if product of bandwidth and distance is less than 500 MHz/km</li> <li>Single mode—None</li> </ul>	<ul style="list-style-type: none"> <li>0 dBm</li> <li>0 dBm</li> </ul>

Table 51: Estimated Values for Factors Causing Link Loss (continued)

Link-Loss Factor	Estimated Link-Loss Value	Sample (LL) Calculation Values
Connector	0.5 dBm	This example assumes 5 connectors. Loss for 5 connectors:  $5(0.5 \text{ dBm}) = 2.5 \text{ dBm}$
Splice	0.5 dBm	This example assumes 2 splices. Loss for two splices:  $2(0.5 \text{ dBm}) = 1 \text{ dBm}$
Fiber attenuation	<ul style="list-style-type: none"> <li>Multimode—1 dBm/km</li> <li>Single mode—0.5 dBm/km</li> </ul>	This example assumes the link is 2 km long. Fiber attenuation for 2 km: <ul style="list-style-type: none"> <li><math>2 \text{ km}(1.0 \text{ dBm/km}) = 2 \text{ dBm}</math></li> <li><math>2 \text{ km}(0.5 \text{ dBm/km}) = 1 \text{ dBm}</math></li> </ul>
Clock Recovery Module (CRM)	1 dBm	1 dBm



**NOTE:** For information about the actual amount of signal loss caused by equipment and other factors, see your vendor documentation for that equipment.

- Calculate the ( $P_M$ ) by subtracting (LL) from ( $P_B$ ):

$$P_B - LL = P_M$$

$$13 \text{ dBm} - 0.5 \text{ dBm [HOL]} - 5 (0.5 \text{ dBm}) - 2 (0.5 \text{ dBm}) - 2 \text{ km} (1.0 \text{ dBm/km}) - 1 \text{ dB [CRM]} = P_M$$

$$13 \text{ dBm} - 0.5 \text{ dBm} - 2.5 \text{ dBm} - 1 \text{ dBm} - 2 \text{ dBm} - 1 \text{ dBm} = P_M$$

$$P_M = 6 \text{ dBm}$$

The calculated power margin is greater than zero, indicating that the link has sufficient power for transmission. Also, the power margin value does not exceed the maximum receiver input power. Refer to the specification for your receiver to find the maximum receiver input power.

- Related Topics**
- Calculating the EX8200 Switch Fiber-Optic Cable Power Budget on page 120
  - Optical Interface Support in EX8200 Switches on page 60
  - Understanding EX8200 Switch Fiber-Optic Cable Signal Loss, Attenuation, and Dispersion on page 106



## PART 3

# Installing and Connecting the Switch and Switch Components

- Installing the Switch on page 125
- Installing Switch Components on page 149
- Connecting the Switch on page 167
- Performing Initial Configuration on page 189



## CHAPTER 8

# Installing the Switch

- Installing and Connecting an EX8208 Switch on page 125
- Unpacking an EX8200 Switch on page 126
- Parts Inventory (Packing List) for an EX8208 Switch on page 130
- Installing Adjustable Mounting Brackets in a Rack or Cabinet for an EX8200 Switch on page 132
- Installing the Power Cord Tray in a Rack or Cabinet for an EX8200 Switch on page 135
- Mounting an EX8208 Switch on a Rack or Cabinet on page 138
- Mounting an EX8208 Switch on a Rack or Cabinet Using a Mechanical Lift on page 141
- Mounting an EX8208 Switch on a Rack or Cabinet Without Using a Mechanical Lift on page 143

## Installing and Connecting an EX8208 Switch

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The EX8208 switch chassis is a rigid sheet-metal structure that houses the other hardware components such as Switch Fabric and Routing Engine (SRE) modules, a Switch Fabric (SF) module, and line cards. The switch ships in a cardboard box that has a two-layer wooden pallet base. The switch chassis is bolted to the pallet base.

To unpack an EX8208 switch, follow instructions in “Unpacking an EX8200 Switch” on page 126.

You can install an EX8208 switch in a 19-in. equipment rack or cabinet by using the front-mounting bracket attached to the chassis. To install the switch in a rack or cabinet, follow the instructions in “Mounting an EX8208 Switch on a Rack or Cabinet Using a Mechanical Lift” on page 141 or “Mounting an EX8208 Switch on a Rack or Cabinet Without Using a Mechanical Lift” on page 143.

To connect an EX8208 switch to earth ground, follow instructions in “Connecting Earth Ground to an EX Series Switch” on page 167.

To connect power to the switch chassis, follow instructions in “Connecting AC Power to an EX8200 Switch” on page 173.

To connect and configure the switch, follow instructions in “Connecting and Configuring an EX Series Switch (CLI Procedure)” on page 190 or “Connecting and Configuring an EX Series Switch (J-Web Procedure)” on page 192.

To connect the switch to a network for out-of-band management, follow instructions in “Connecting an EX Series Switch to a Network for Out-of-Band Management” on page 187. To connect the switch to a management console, follow instructions in “Connecting an EX Series Switch to a Management Console” on page 181.

- Related Topics**
- Rack Requirements for an EX8208 Switch on page 97
  - Cabinet Requirements and Specifications for an EX8208 Switch on page 100
  - Clearance Requirements for Airflow and Hardware Maintenance for an EX8208 Switch on page 101
  - Chassis Lifting Guidelines for EX8200 Switches on page 276

## Unpacking an EX8200 Switch

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After you prepare the installation site as described in “Site Preparation Checklist for an EX8200 Switch” on page 91, you may unpack the switch.



**NOTE:** The switch is maximally protected inside the shipping box. Do not unpack it until you are ready to begin installation.

Ensure that you have the following parts and tools available to unpack the EX8200 switch:

- A 7/16-in. or 11-mm open-end or socket wrench to remove the bracket bolts from the shipping pallet
- A box cutter or packing knife to slice open the tape that seals the top of the box

The switch ships in a cardboard box that has a two-layer wooden pallet base with foam cushioning between the layers. The switch chassis is bolted to the pallet base.

The EX8208 chassis ships with the Switch Fabric and Routing Engine (SRE) module(s), Switch Fabric (SF) module, fan tray, and power supplies for the configuration you ordered already installed. Any line cards ordered ship separately.

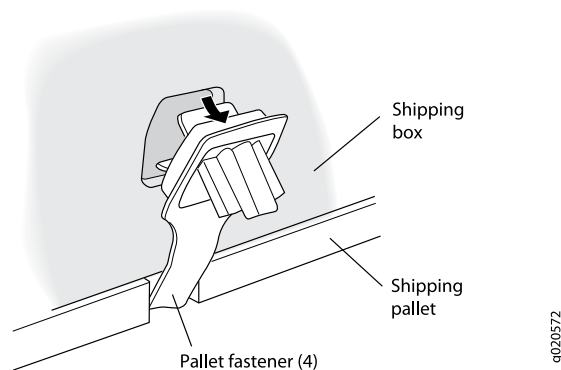
The EX8216 chassis ships with the Routing Engine (RE) module(s), SF modules, fan trays, and power supplies for the configuration you ordered already installed. Any line cards ordered ship separately.

See “EX8208 Switch Configurations” on page 6 and EX8216 Switch Configurations for information about base configurations and redundant configurations.

To unpack the switch (see Figure 39 on page 128 and Figure 40 on page 129):

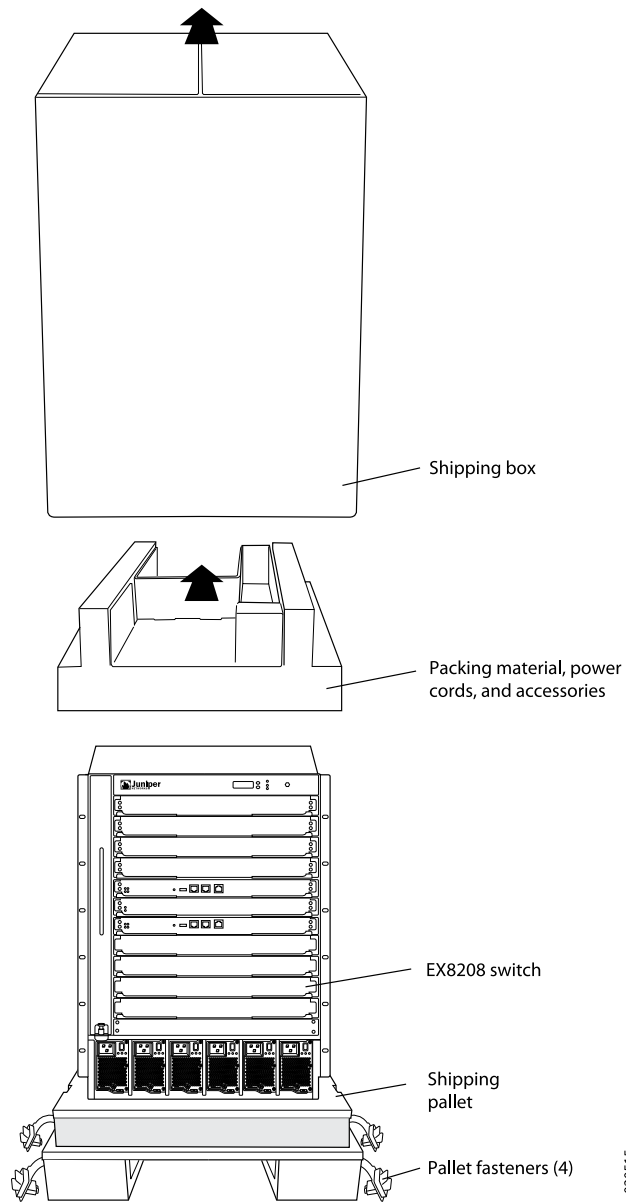
1. Move the shipping box to a staging area as close to the installation site as possible. For an EX8208 switch, make sure there is enough space to remove components from the chassis if necessary (for example, if you do not have a mechanical lift to use when you install the switch). While the chassis is bolted to the pallet, you can use a forklift or pallet jack to move it.
2. Position the shipping box with the arrows pointing up.
3. Open the four pallet fasteners near the bottom of the shipping box that attach the cardboard box to the wooden pallet. To open a pallet fastener, squeeze together the two ridges (“fins”) in the depression in the latch, then slide the pallet fastener out of the cardboard box slot in which it is inserted. See Figure 38 on page 127.

**Figure 38: Pallet Fastener**



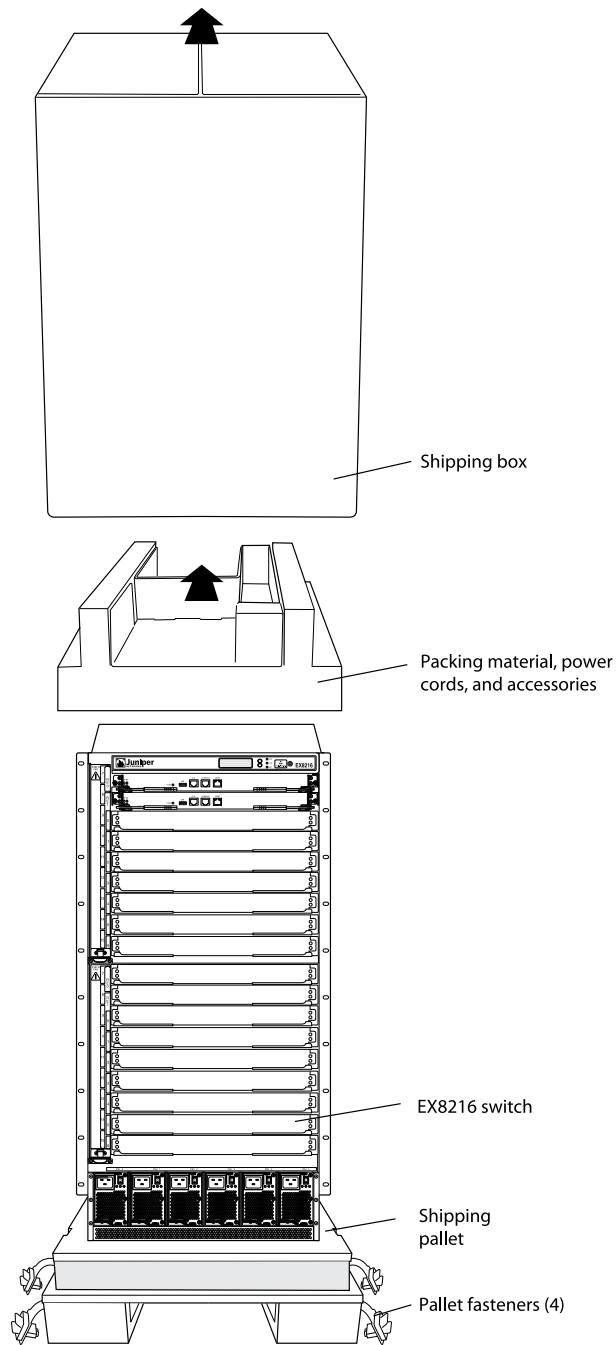
4. Carefully slice open the tape that holds the top of the cardboard box closed and open the top of the box.
5. Remove the cardboard accessory box from the center of the foam padding.
6. Remove the foam padding from the top of the box.
7. Slide the cardboard box off the pallet.
8. Remove the plastic cover from the switch chassis.
9. Use a 7/16-in. or 11-mm open-end or socket wrench to remove the four sets of bracket bolts that secure the chassis to the shipping pallet.
10. Unpack the accessory box and lay out the contents so that they are ready for use.
11. Verify that your order includes all appropriate parts. See “Parts Inventory (Packing List) for an EX8208 Switch” on page 130 and Parts Inventory (Packing List) for an EX8216 Switch.
12. Store the brackets and bolts inside the accessory box.
13. Save the shipping box, pallet, and packing materials in case you need to move or ship the switch at a later time.

Figure 39: Unpacking an EX8208 Switch



9020515

Figure 40: Unpacking an EX8216 Switch



- Related Topics**
- Mounting an EX8208 Switch on a Rack or Cabinet on page 138
  - Mounting an EX8216 Switch on a Rack or Cabinet

## Parts Inventory (Packing List) for an EX8208 Switch

The switch shipment includes a packing list. Check the parts you receive in the switch shipping crate against the items on the packing list. The packing list specifies the part number and description of each part in your order. The parts shipped depend on the configuration you order. See “EX8208 Switch Configurations” on page 6 for more information.

If any part on the packing list is missing, contact your customer service representative or contact Juniper customer care from within the U.S. or Canada by telephone at 1-800-638-8296. For international-dial or direct-dial options in countries without toll-free numbers, see <http://www.juniper.net/support/requesting-support.html>.



**NOTE:** All line cards ordered are shipped separately. Line cards are not listed on the switch’s packing list.



**NOTE:** The base configuration is available only with AC power supplies. The redundant configuration ships with either AC or DC power supplies.

Table 52 on page 130 lists the parts and their quantities in the packing list for a base configuration and a redundant configuration switch.

**Table 52: Parts List for Different EX8208 Switch Configurations**

Component	Base Configuration Quantity	Redundant Configuration Quantity
Chassis, including the backplane and front-mounting brackets	1	1
Switch Fabric and Routing Engine (SRE) module	1	2
Switch Fabric (SF) module	1	1
Power supplies	2 AC	6 AC or 4 DC
Power supply cords	2 (1 per power supply)	6 (1 per AC power supply)
Fan tray	1	1
Cover panels for slots without installed components	<ul style="list-style-type: none"> <li>• Line card cover panels: 8</li> <li>• SRE module cover panel: 1</li> <li>• Power supply cover panels: 4</li> </ul>	<ul style="list-style-type: none"> <li>• Line card cover panels: 8</li> </ul>

Table 53 on page 131 lists the parts contained in the accessory box. The same accessories ship with both configurations of the switch.



Table 53: Accessory Box Parts List

Component	Quantity
Label, accessories contents	1
Accessory kit box	1
<i>Quick Start</i> installation instructions	1
Left front adjustable mounting bracket	1
Right front adjustable mounting bracket	1
Rear adjustable mounting brackets	2
Screws to connect the front pieces and rear pieces of the adjustable mounting brackets for four-post rack installation.	12
Each bracket consists of a front piece and a rear piece. Six screws connect the front-and-rear pieces of each of the two adjustable mounting brackets.	
Power cord tray	1
Velcro tie-wraps for power cord tray	12
Power cord retainers	6
Juniper Networks Product Warranty	1
End User License Agreement	1
Juniper Compliance Form Letter, RoHS Worldwide	1
Ethernet cable, RJ-45/RJ-45, 4-pair stranded UTP, category #5	1
RJ-45 to female DB-9 cable, to connect to the switch's console port using a management PC's serial port	1
ESD grounding strap	1



NOTE: You must provide mounting screws that are appropriate for your rack to front-mount the chassis on a rack or a cabinet.

For two-post rack installation, you need 28 screws: 24 screws to attach the front-mounting bracket “ears” that come installed on the chassis to the front of the rack and 4 screws to install the power cord tray. (The power cord tray is mandatory for two-post rack installation.)

For four-post rack installation, you need either 40 or 44 screws: 24 screws to attach the front-mounting bracket “ears” that come installed on the chassis to the front of the rack, 16 screws to attach the adjustable mounting brackets to the rack, and 4 screws if you install the optional power cord tray.

- Related Topics**
- Unpacking an EX8200 Switch on page 126
  - EX8208 Switch Hardware Overview on page 3

## Installing Adjustable Mounting Brackets in a Rack or Cabinet for an EX8200 Switch

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To mount the switch on a four-post rack or cabinet, you must first install the adjustable mounting brackets in the rack or cabinet. (The remainder of this topic uses “rack” to mean “rack or cabinet.”) The EX8200 switch comes with a four-piece set of adjustable mounting brackets that supports the chassis in the rack.



NOTE: The adjustable mounting brackets are not for installation in two-post racks.

The four adjustable mounting bracket pieces are:

- 1 left front adjustable mounting bracket. The bracket is labeled “LEFT FRONT” on the side of the bracket that faces the interior of the rack, near the holes for attaching the bracket to the rack.
- 1 right front adjustable mounting bracket. The bracket is labeled “RIGHT FRONT” on the side of the bracket that faces the interior of the rack, near the holes for attaching the bracket to the rack.
- 2 rear adjustable mounting brackets. These brackets are labeled “REAR” on the side of the bracket that faces the interior of the rack, near the holes for attaching the bracket to the rack. The rear brackets are interchangeable; you can use either of the rear brackets with the right or left front adjustable mounting bracket.

Ensure that you have the following parts and tools available to install the adjustable mounting brackets:

- A Phillips (+) screwdriver, number 1, 2, or 3, depending on the size of your rack mounting screws
- A Phillips (+) screwdriver, number 2 to install the screws that connect the rear and front mounting brackets

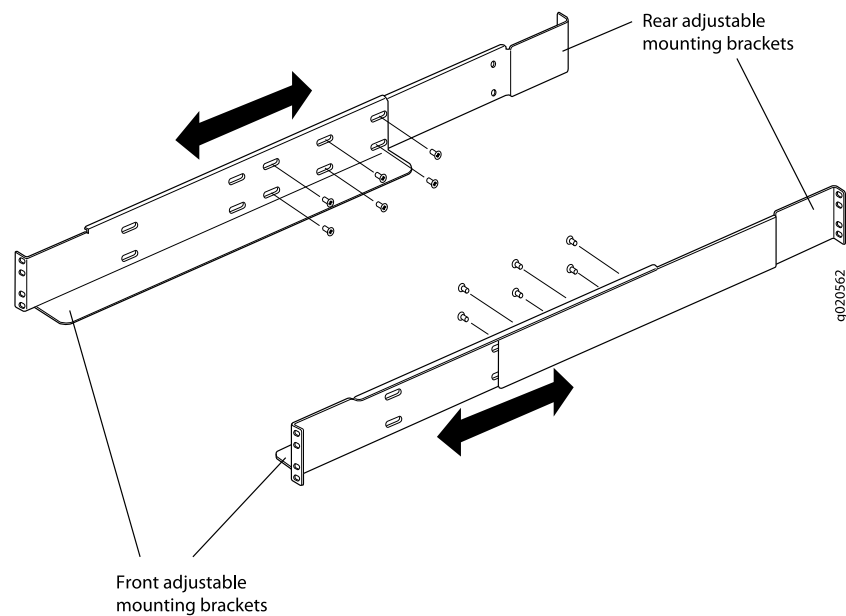
- 16 mounting screws appropriate for your rack to attach the four mounting bracket pieces to the rack

When you install the adjustable mounting brackets, the “arms” of the brackets overlap. The overlap area adjusts the total bracket length to fit three standard rack sizes: 23.62 in. (600 mm), 30 in. (762 mm), and 31.5 in. (800 mm).

To install the mounting brackets in a four-post rack (see Figure 42 on page 135 and Figure 43 on page 135):

1. Remove the adjustable mounting brackets from the accessory box.
2. Decide where to position the switch in the rack. If the rack is empty, position the switch in the lowest possible location. See “Rack Requirements for an EX8208 Switch” on page 97, Rack Requirements for an EX8216 Switch, “Cabinet Requirements and Specifications for an EX8208 Switch” on page 100, and Cabinet Requirements and Specifications for an EX8216 Switch.
3. Position the left front adjustable mounting bracket at the desired position in the left side of the rack and line up its front screw holes with the holes in the rack. Use 4 mounting screws appropriate for your rack to attach the left front bracket to the rack.
4. Position one of the rear brackets at the left rear of the rack on the same level as the left front bracket, so that the rear bracket overlaps with the left front bracket. The screw holes for connecting the front and rear brackets should overlap. Use 4 mounting screws appropriate for your rack to attach the rear bracket to the rack.
5. Connect left front and rear brackets (see Figure 41 on page 134):
  - a. Insert 6 of the screws provided with the mounting brackets into the overlapping bracket holes.
  - b. Hand tighten the screws fully (to 12–16 in.-lb torque) using a number 2 Phillips screwdriver.

Figure 41: Adjustable Mounting Brackets for Four-Post Rack Installation



6. Position the right front adjustable mounting bracket at the desired position in the right side of the rack opposite the installed left front bracket, so that it is on the same rack level as the left bracket. If the right and left front brackets are not on the same level, the chassis will rest at an angle in the rack instead of resting flat and level. Line up the right bracket's front screw holes with the holes in the rack. Use 4 mounting screws appropriate for your rack to attach the right front bracket to the rack.
7. Position the other rear bracket at the right rear of the rack on the same level as the right front bracket, so that the rear bracket overlaps with the right front bracket. The screw holes for connecting the front and rear brackets should overlap. Use 4 mounting screws appropriate for your rack to attach the rear bracket to the rack.
8. Connect the right front and rear brackets (see Figure 41 on page 134):
  - a. Insert 6 of the screws provided with the mounting brackets into the overlapping bracket holes.
  - b. Hand tighten the screws fully (to 12–16 in.-lb torque) using a number 2 Phillips screwdriver.

Figure 42: Adjustable Mounting Brackets Installed in a Four-Post Rack (EX8208 Switch)

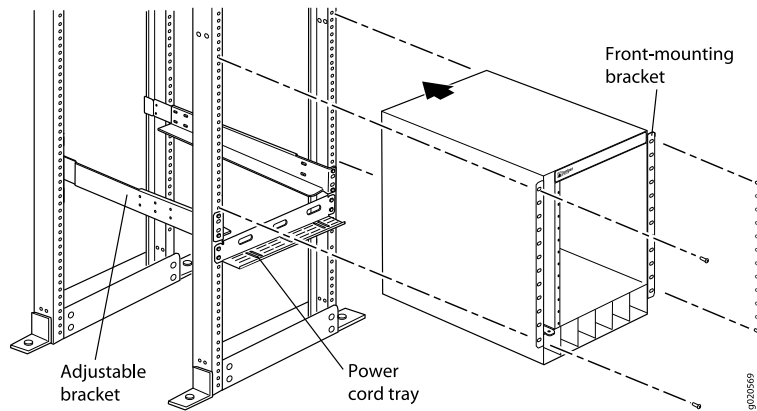
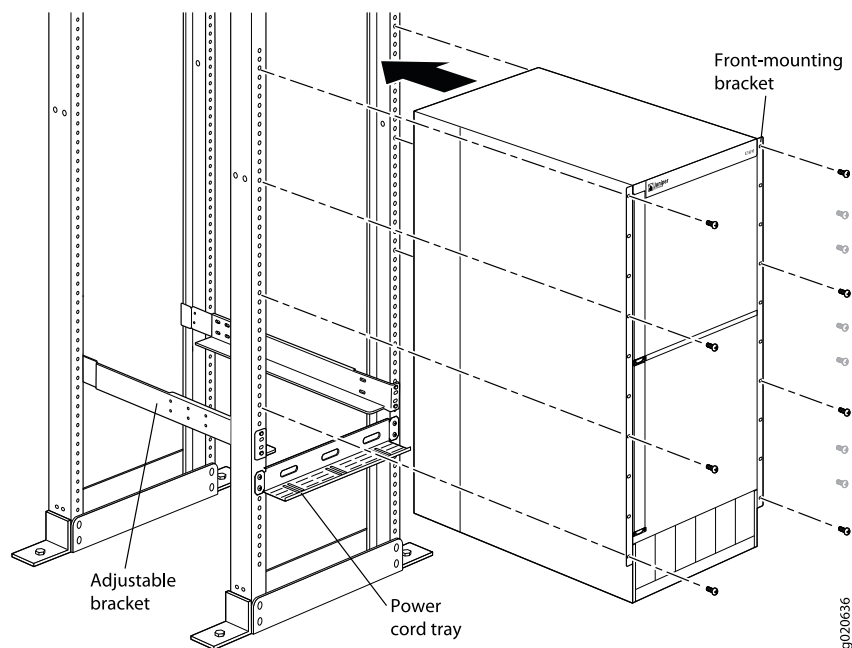


Figure 43: Adjustable Mounting Brackets Installed in a Four-Post Rack (EX8216 Switch)



- Related Topics**
- Mounting an EX8208 Switch on a Rack or Cabinet Using a Mechanical Lift on page 141
  - Mounting an EX8208 Switch on a Rack or Cabinet Without Using a Mechanical Lift on page 143
  - Mounting an EX8216 Switch on a Rack or Cabinet

## Installing the Power Cord Tray in a Rack or Cabinet for an EX8200 Switch

The power cord tray is supplied with all EX8200 switches. The power cord tray is optional for four-post rack or cabinet installation but mandatory for a two-post rack or cabinet installation. (The remainder of this topic uses “rack” to mean “rack or cabinet.”) To mount

an EX8208 switch in a two-post rack, you must install the power cord tray in the rack before installing the switch.



**NOTE:** The EX8216 switch can be installed only in a four-post rack. Installation in a two-post rack is not supported.

The power cord tray provides support for the front of the EX8208 chassis during installation of the switch in a two-post rack. The front edge of the chassis rests on the upper edge (lip) of the power cord tray.

The power cord tray provides a place to organize and tie down the power cords for the power supplies.

The power cord tray uses 1 U of rack space, so the total space occupied by an EX8208 switch chassis and power cord tray is 15 U, and the total space occupied by an EX8216 switch chassis and power cord tray is 22 U.

Ensure that you have the following tools and parts available to install the power cord tray:

- A Phillips (+) screwdriver, number 1, 2, or 3, depending on the size of your rack mounting screws
- 4 mounting screws appropriate for your rack to attach the power cord tray to the rack

To install the power cord tray (see Figure 44 on page 137 and Figure 45 on page 137):

1. Remove the power cord tray from the accessory box.
2. Decide where to position the switch in the rack. If the rack is empty, choose the lowest possible location. See “Rack Requirements for an EX8208 Switch” on page 97, Rack Requirements for an EX8216 Switch, “Cabinet Requirements and Specifications for an EX8208 Switch” on page 100 and Cabinet Requirements and Specifications for an EX8216 Switch.



**NOTE:** To mount an EX8208 switch on a two-post rack, you must install the power cord tray in the rack before installing the switch. See Figure 45 on page 137. Installation of an EX8216 switch in a two-post rack is not supported.

3. Position the power cord tray in the rack space immediately below the position in which you want to install the switch (in a two-post rack) or where the switch is installed (in a four-post rack) (see Figure 44 on page 137). Line up the screw holes of the power cord tray with the holes in the rack. Use 4 mounting screws appropriate for your rack to attach the power cord tray to the rack.

Figure 44: Installing the Power Cord Tray in a Four-Post Rack

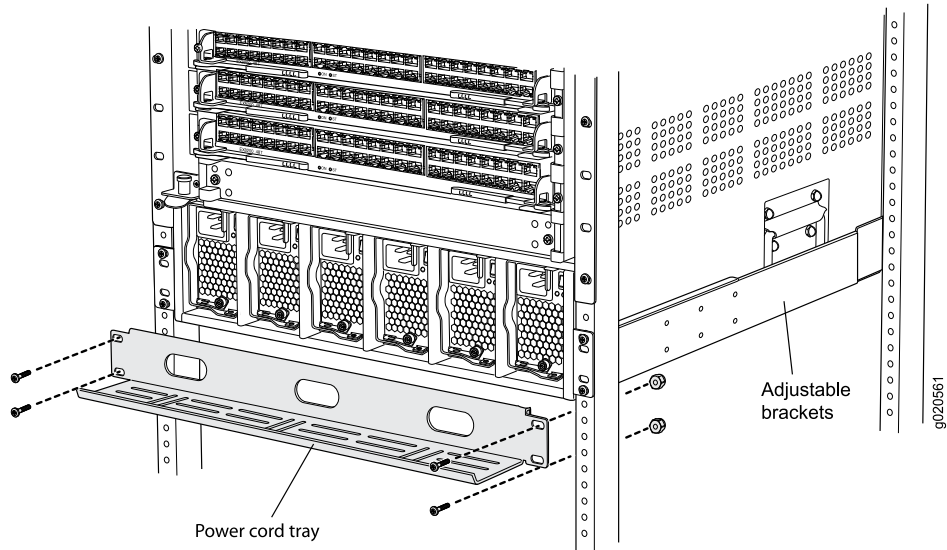
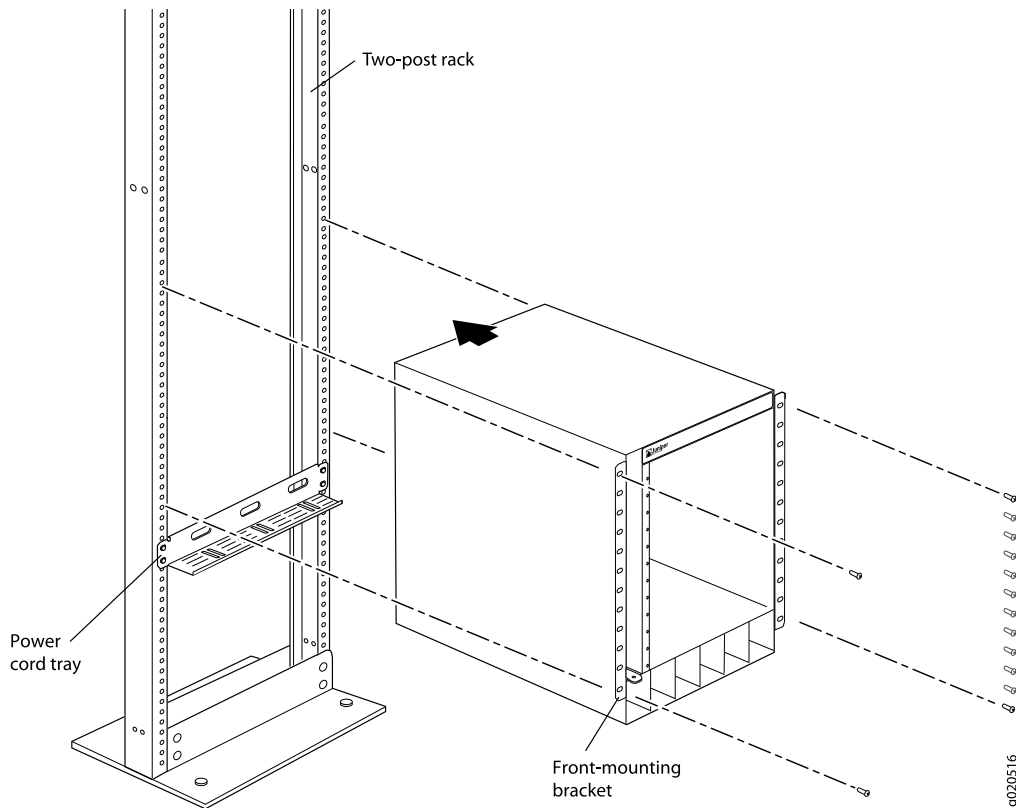


Figure 45: Power Cord Tray Installed in a Two-Post Rack



- Related Topics**
- Mounting an EX8208 Switch on a Rack or Cabinet on page 138
  - Mounting an EX8216 Switch on a Rack or Cabinet

## Mounting an EX8208 Switch on a Rack or Cabinet

The EX8208 switch ships installed with front-mounting brackets on the chassis for mounting the switch on a 19-in. equipment rack or cabinet. The switch also comes with adjustable mounting brackets to support it in the rack.

In a four-post rack, the switch consumes 14 U without the optional power cord tray and 15 U with the optional power cord tray. In a two-post rack, the power cord tray is mandatory. The switch with the power cord tray consumes 15 U. You can mount up to three switches on a 42 U four-post rack or on a 45 U two-post rack provided that the racks meet the strength requirements to support the combined weight of the switches.



**NOTE:** If you are mounting multiple switches on a rack or cabinet, mount a switch on the bottom of the rack or cabinet first and then mount the rest of the switches from bottom to top.



**WARNING:** If you install the switch without using a mechanical lift, at least three people must be available to lift the unloaded switch chassis (all components except the backplane removed) onto the adjustable mounting brackets (in a four-post rack or cabinet) or onto the lip of the power cord tray (in a two-post rack or cabinet).



**CAUTION:** Do not install line cards in the chassis until after you mount the chassis securely on a rack or cabinet.

Before mounting an EX8208 switch on a rack or cabinet:

- Verify that the site meets the requirements described in “Site Preparation Checklist for an EX8200 Switch” on page 91.
- Place the rack or cabinet in its permanent location, allowing adequate clearance for airflow and maintenance, and secure it to the building structure. See “Clearance Requirements for Airflow and Hardware Maintenance for an EX8208 Switch” on page 101 for detailed information.
- Read “General Safety Guidelines and Warnings for EX Series Switches” on page 263, with particular attention to “Chassis Lifting Guidelines for EX8200 Switches” on page 276.
- Remove the switch from the shipping box (see “Unpacking an EX8200 Switch” on page 126).

Ensure that you have the following parts and tools available to mount the switch on a rack or cabinet:

- A Phillips (+) screwdriver, number 2 or number 3, depending on the size of your rack mounting screws, for mounting the switch on a rack or cabinet



- A Phillips (+) screwdriver, number 1, to remove the power supplies from the chassis if you are mounting the switch without using a mechanical lift
- 24 mounting screws appropriate for your rack

To mount the EX8208 switch on a rack or cabinet (see Figure 46 on page 140 and Figure 47 on page 140):

1. In a four-post rack or cabinet, install the adjustable mounting brackets at the desired position (see “Installing Adjustable Mounting Brackets in a Rack or Cabinet for an EX8200 Switch” on page 132).

In a two-post rack or cabinet, install the power cord tray (see “Installing the Power Cord Tray in a Rack or Cabinet for an EX8200 Switch” on page 135). The power cord tray is optional for four-post rack installation.

2. Lift the chassis into the rack using a mechanical lift. For instructions on how to install the chassis using a mechanical lift, see “Mounting an EX8208 Switch on a Rack or Cabinet Using a Mechanical Lift” on page 141.

In a four-post rack, place the chassis on the adjustable mounting brackets. In a two-post rack, place the front edge of the chassis on the lip of the power cord tray with at least three people supporting the rear of the chassis until you can bolt the chassis into the rack.

If a mechanical lift is not available, remove all components and ensure that at least three people are available to lift the empty chassis into the rack. For instructions on how to install the chassis without using a mechanical lift, see “Mounting an EX8208 Switch on a Rack or Cabinet Without Using a Mechanical Lift” on page 143.

3. Insert 24 mounting screws appropriate for your rack (not provided) into the aligned holes. Use the appropriate Phillips (+) screwdriver to tighten the screws to the rack or cabinet rail.

Figure 46: Installing an EX8208 Switch in a Two-Post Rack

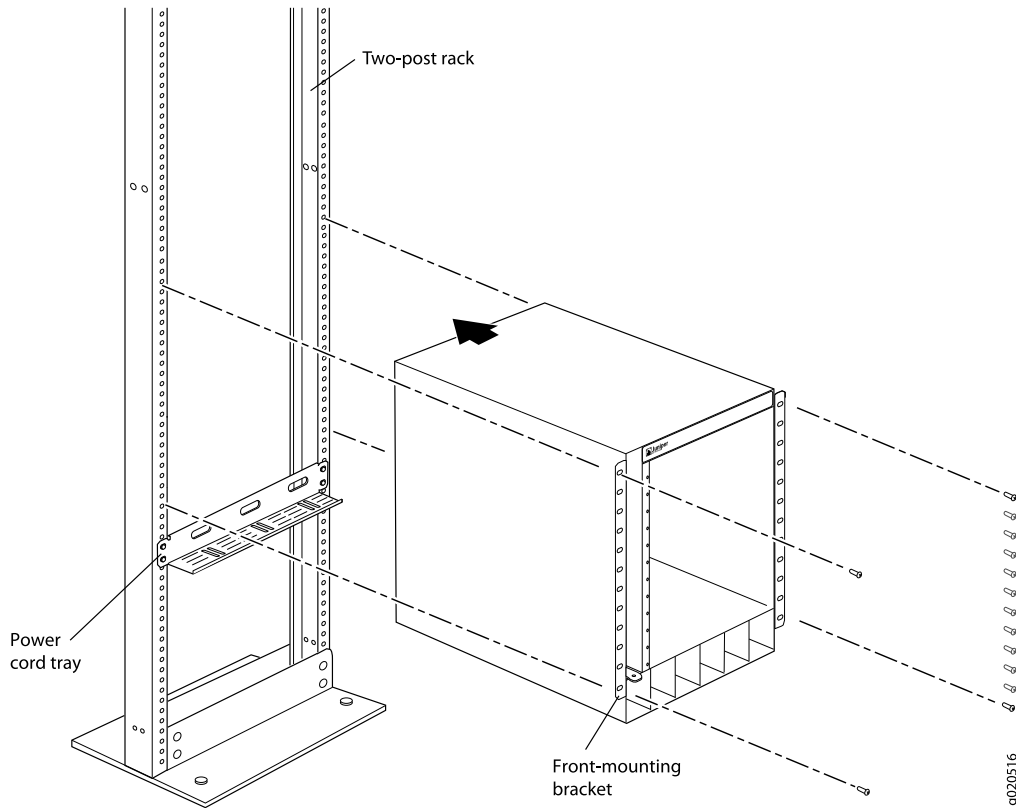
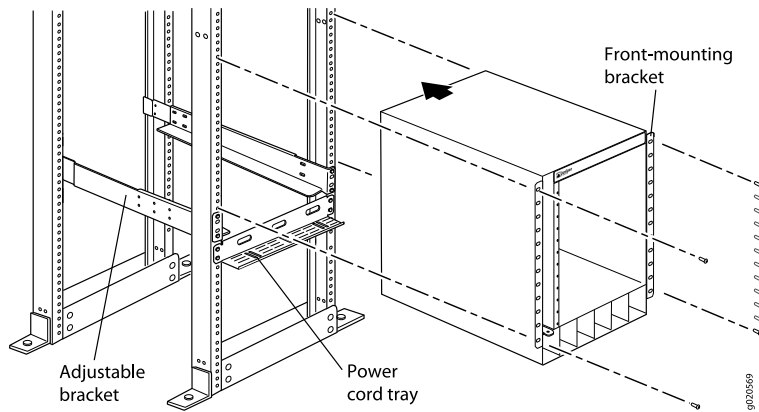


Figure 47: Installing an EX8208 Switch in a Four-Post Rack



- Related Topics**
- Connecting AC Power to an EX8200 Switch on page 173
  - Rack Requirements for an EX8208 Switch on page 97
  - Cabinet Requirements and Specifications for an EX8208 Switch on page 100

## Mounting an EX8208 Switch on a Rack or Cabinet Using a Mechanical Lift

Because of the switch's size and weight, we strongly recommend using a mechanical lift to install the switch.



**NOTE:** For instructions on installing a switch without using a mechanical lift, see “Mounting an EX8208 Switch on a Rack or Cabinet Without Using a Mechanical Lift” on page 143.



**CAUTION:** Do not install line cards in the chassis until after you mount the chassis securely on a rack or cabinet.



**CAUTION:** Before front-mounting the switch on a rack or cabinet, have a qualified technician verify that the rack or cabinet is strong enough to support the switch's weight and is adequately supported at the installation site.

Before you install the switch:

- Prepare the site for installation as described in “Site Preparation Checklist for an EX8200 Switch” on page 91.
- Ensure the site has adequate clearance for both airflow and hardware maintenance as described in “Clearance Requirements for Airflow and Hardware Maintenance for an EX8208 Switch” on page 101.
- Unpack the switch as described in “Unpacking an EX8200 Switch” on page 126.
- In a two-post rack, install the power cord tray at the desired position (see “Installing the Power Cord Tray in a Rack or Cabinet for an EX8200 Switch” on page 135). The lip of the power cord tray will support the front of the chassis when you install the switch in the two-post rack.
- In a four-post rack, install the adjustable mounting brackets at the desired position (see “Installing Adjustable Mounting Brackets in a Rack or Cabinet for an EX8200 Switch” on page 132). Optionally, you can also install the power cord tray and use it to manage the power supply cords.
- Review chassis lifting guidelines described in “Chassis Lifting Guidelines for EX8200 Switches” on page 276.

Ensure that you have the following parts and tools available to install the switch:

- A mechanical lift
- 24 mounting screws appropriate for your rack
- A Phillips (+) screwdriver, number 2 or number 3, depending on the size of your rack mounting screws

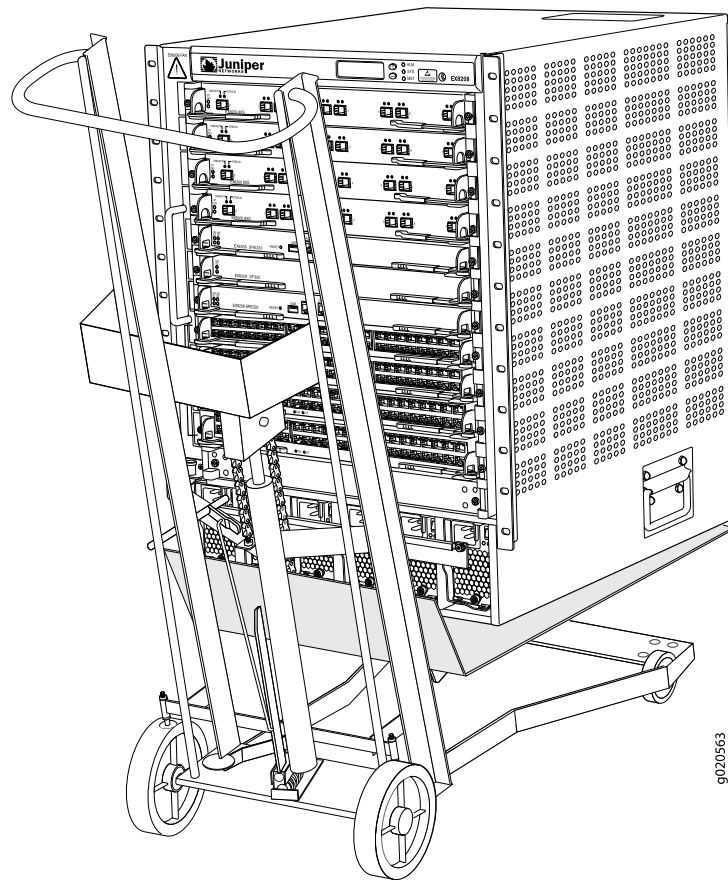


**CAUTION:** If you are installing more than one switch in a rack or cabinet, install the first switch at the bottom of the rack.

To install the switch using a mechanical lift (see Figure 48 on page 142):

1. Ensure that the rack or cabinet is placed in its permanent location and is secured to the building. Ensure that the installation site allows adequate clearance for both airflow and maintenance. For details, see “Clearance Requirements for Airflow and Hardware Maintenance for an EX8208 Switch” on page 101.
2. Load the switch onto the lift, making sure it rests securely on the lift platform.

**Figure 48: Installing the EX8208 Switch Chassis Using a Mechanical Lift**



3. Using the lift, position the switch in front of the rack or cabinet, centering it in front of the adjustable mounting brackets and/or power cord tray installed in the rack.
4. Lift the chassis approximately 0.75 in. (1.9 cm) above the surface of the adjustable mounting brackets/power cord tray. Position the chassis in the rack as close as possible to resting on the support that the mounting brackets and/or power cord tray provide.
5. In a four-post rack, carefully slide the switch onto the adjustable mounting brackets until the front-mounting brackets (“ears”) attached to the chassis contact the rack

rails. The adjustable mounting brackets installed in the rack ensure that the holes in the front-mounting brackets align with the holes in the rack rails.

In a two-post rack, carefully slide the switch into the rack ensuring that the front bottom of the chassis rests on the lip of the power cord tray. The front-mounting brackets (“ears”) prevent the chassis from tipping too far back.

6. Move the lift away from the rack.
7. In a four-post rack, slide the chassis so that the front-mounting bracket is flush with the front of the rack.

In a two-post rack, push the bottom of the chassis so that the front-mounting bracket is flush with the front of the rack.

8. Install a mounting screw into each of the open front-mounting holes aligned with the rack, starting from the bottom.
9. Visually inspect the alignment of the switch. If the switch is installed properly in the rack, all the mounting screws on one side of the rack are aligned with the mounting screws on the opposite side and the switch is level.
10. After ensuring that the switch is aligned properly, tighten the screws.

- Related Topics**
- Powering On an EX8200 Switch on page 180
  - Connecting and Configuring an EX Series Switch (CLI Procedure) on page 190
  - Connecting and Configuring an EX Series Switch (J-Web Procedure) on page 192

## Mounting an EX8208 Switch on a Rack or Cabinet Without Using a Mechanical Lift

If you cannot use a mechanical lift to install the switch (the preferred method), you can install it manually.



**CAUTION:** The chassis with only the backplane and no other components weighs approximately 89 lb (41 kg). Lifting the chassis and mounting it in a rack or cabinet requires at least three people.

The chassis has two handles. Do not lift a fully loaded chassis by the handles; make sure the chassis is empty (contains only the backplane) before you lift it. If two of the people lifting the chassis use the handles to lift it, the third person must lift from the rear of the chassis. The rear of the chassis is heavier than the front of the chassis, so when you lift the chassis by the handles, the chassis tips toward the heavier back end. The person lifting from the back must be aware of this behavior and must be braced to prevent the chassis from tipping over.

When lifting the chassis, do not grasp the switch by the blue panel at the top front of the chassis. Doing so can cause the panel to pop off of the switch.



.....

**CAUTION:** Before front-mounting the switch in a rack, have a qualified technician verify that the rack is strong enough to support the switch's weight and is adequately supported at the installation site.

.....

Before you install the switch:

1. Prepare the site for installation as described in "Site Preparation Checklist for an EX8200 Switch" on page 91.
2. Ensure the site has adequate clearance for both airflow and hardware maintenance as described in "Clearance Requirements for Airflow and Hardware Maintenance for an EX8208 Switch" on page 101.
3. Unpack the switch as described in "Unpacking an EX8200 Switch" on page 126.
4. Remove all components except the backplane from the chassis. See:
  - Removing an SRE Module from an EX8208 Switch on page 215
  - Removing an SF Module from an EX8208 Switch on page 217
  - Removing a Line Card from an EX8200 Switch on page 218
  - Removing a Fan Tray from an EX8208 Switch on page 211
  - Removing an AC Power Supply from an EX8200 Switch on page 207
5. In a two-post rack, install the power cord tray at the desired position (see "Installing the Power Cord Tray in a Rack or Cabinet for an EX8200 Switch" on page 135). The lip of the power cord tray will support the front of the chassis when you install the switch in the rack.  
  
In a four-post rack, install the adjustable mounting brackets at the desired position (see "Installing Adjustable Mounting Brackets in a Rack or Cabinet for an EX8200 Switch" on page 132). Optionally, you can also install the power cord tray and use it to manage the power supply cords.
6. Review chassis lifting guidelines as described in "Chassis Lifting Guidelines for EX8200 Switches" on page 276.

Ensure that you have the following parts and tools available to install the switch:

- 24 mounting screws appropriate for your rack
- A Phillips (+) screwdriver, number 2 or number 3, depending on the size of your rack mounting screws

To install the switch in the rack or cabinet (see Figure 50 on page 146 and Figure 51 on page 147):



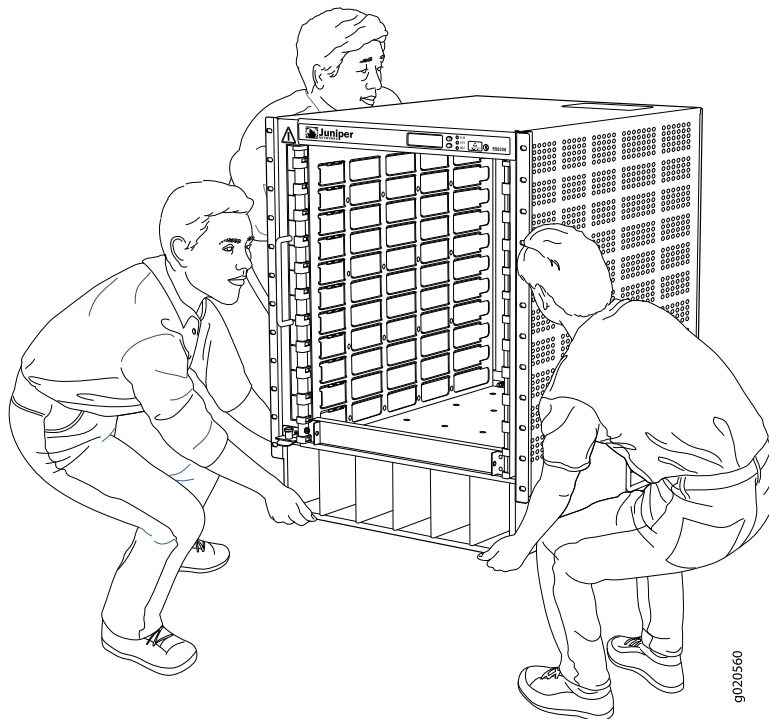
**CAUTION:** If you are installing more than one switch in a rack or cabinet, install the first one at the bottom of the rack. Do not attempt to install a switch manually in an upper position in a rack or cabinet.

1. Ensure that the rack or cabinet is placed in its permanent location and is secured to the building.
2. Position the switch in front of the rack or cabinet, centering it in front of the adjustable mounting brackets. Use a pallet jack if one is available.
3. With one person on each side and one person in the rear, hold the bottom of the chassis and carefully lift it onto the adjustable mounting brackets installed in a four-post rack or onto the power cord tray installed in a two-post rack. See Figure 49 on page 145.



**WARNING:** To prevent injury, keep your back straight and lift with your legs, not your back. Do not twist your body as you lift. Balance the load evenly and be sure that your footing is firm.

**Figure 49: Lifting an EX8208 Switch Chassis Without Using a Mechanical Lift**



4. In a four-post rack, carefully slide the switch onto the adjustable mounting brackets until the front-mounting brackets attached to the chassis contact the rack rails. The

adjustable mounting brackets ensure that the holes in the front-mounting brackets attached to the chassis align with the holes in the rack rails.

In a two-post rack, carefully slide the switch over the lip of the power cord tray and into the rack. Push the bottom of the chassis so that the front-mounting bracket is flush with the front of the rack.

5. Install a mounting screw into each of the open front-mounting holes aligned with the rack, starting from the bottom.
6. Visually inspect the alignment of the chassis. If the chassis is installed properly in the rack, all the mounting screws on one side of the rack are aligned with the mounting screws on the opposite side and the switch is level.
7. After ensuring that the switch is aligned properly, tighten the screws.

**Figure 50: Installing an EX8208 Switch in a Four-Post Rack**

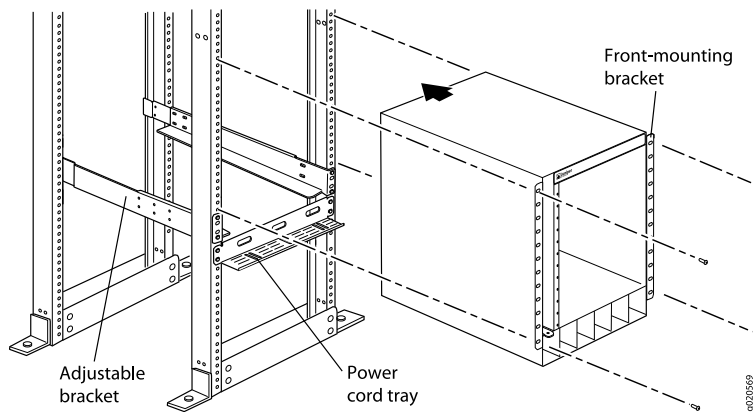
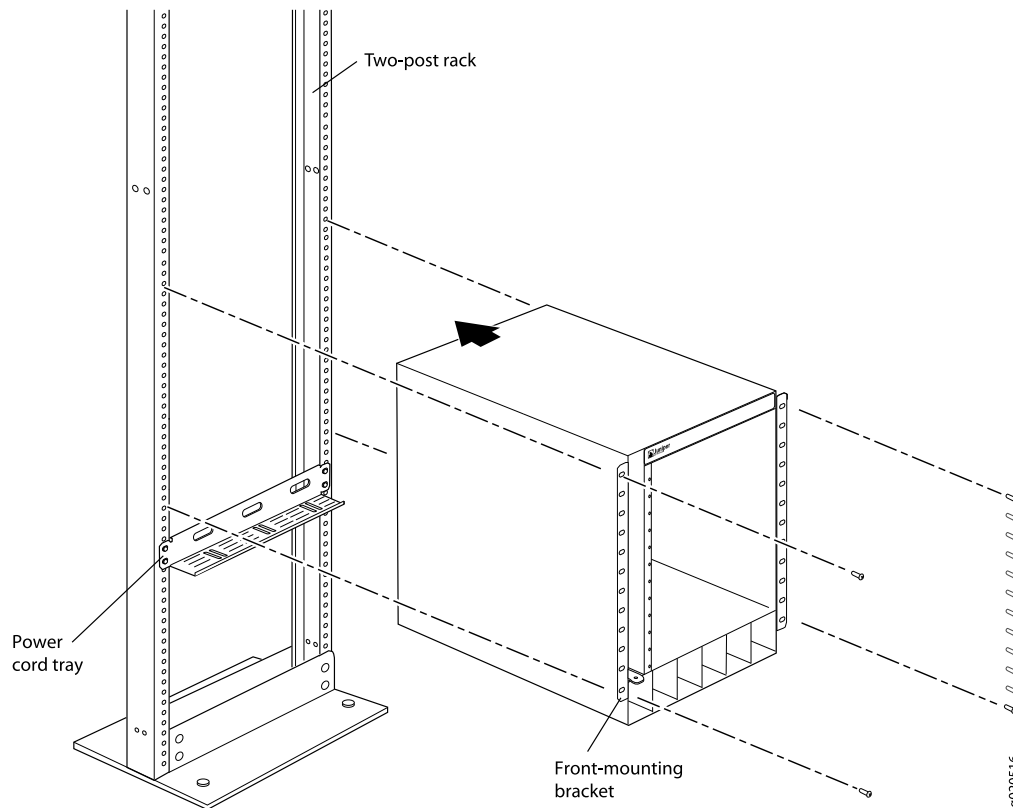




Figure 51: Installing an EX8208 Switch in a Two-Post Rack



After you install the mounting screws and securely bolt the chassis to the rack, reinstall the components in the chassis. See:

- Installing an SRE Module in an EX8208 Switch on page 155
- Installing an SF Module in an EX8208 Switch on page 157
- Installing a Line Card in an EX8200 Switch on page 160
- Installing a Fan Tray in an EX8208 Switch on page 154
- Installing an AC Power Supply in an EX8200 Switch on page 150

#### Related Topics

- Powering On an EX8200 Switch on page 180
- Connecting and Configuring an EX Series Switch (CLI Procedure) on page 190
- Connecting and Configuring an EX Series Switch (J-Web Procedure) on page 192



## CHAPTER 9

# Installing Switch Components

- Installing and Removing EX8208 Switch Hardware Components on page 149
- Installing an AC Power Supply in an EX8200 Switch on page 150
- Installing a DC Power Supply in an EX8200 Switch on page 152
- Installing a Fan Tray in an EX8208 Switch on page 154
- Installing an SRE Module in an EX8208 Switch on page 155
- Installing an SF Module in an EX8208 Switch on page 157
- Unpacking a Line Card Used in an EX8200 Switch on page 159
- Installing a Line Card in an EX8200 Switch on page 160
- Installing a Transceiver in an EX Series Switch on page 163
- Connecting a Fiber-Optic Cable to an EX Series Switch on page 165

## Installing and Removing EX8208 Switch Hardware Components

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The field-replaceable units (FRUs) in an EX8208 switch are:

- Switch Fabric and Routing Engine (SRE) module
- Switch Fabric (SF) module
- 8-port SFP+ line card
- 40-port SFP+ line card
- 48-port SFP line card
- 48-port RJ-45 line card
- Power supplies (AC and DC)
- Fan tray
- SFP transceiver
- SFP+ transceiver

The SRE module and SF module are hot-removable or hot-pluggable depending on the configuration of the switch. See “EX8208 Switch Configurations” on page 6.

All the line cards are hot-removable and hot-insertable. However, we recommend that you take them offline before removing them.

The AC and DC power supplies, fan tray, SFP transceiver, and SFP+ transceiver in EX8200 switches are hot-removable and hot-insertable FRUs: you can remove and replace them without powering off the switch or disrupting switch functions.

To install an SRE module in an EX8208 switch, follow instructions in “Installing an SRE Module in an EX8208 Switch” on page 155. To remove an SRE module from an EX8208 switch, follow instructions in “Removing an SRE Module from an EX8208 Switch” on page 215.

To install an SF module in an EX8208 switch, follow instructions in “Installing an SF Module in an EX8208 Switch” on page 157. To remove an SF module from an EX8208 switch, follow instructions in “Removing an SF Module from an EX8208 Switch” on page 217.

To install a line card in an EX8208 switch, follow instructions in “Installing a Line Card in an EX8200 Switch” on page 160. To remove a line card in an EX8208 switch, follow instructions in “Removing a Line Card from an EX8200 Switch” on page 218.

To install an AC power supply in an EX8208 switch, follow instructions in “Installing an AC Power Supply in an EX8200 Switch” on page 150. To remove a power supply from an EX8208 switch, follow instructions in “Removing an AC Power Supply from an EX8200 Switch” on page 207.

To install a DC power supply in an EX8208 switch, follow instructions in “Installing a DC Power Supply in an EX8200 Switch” on page 152. To remove a DC power supply from an EX8208 switch, follow instructions in “Removing a DC Power Supply from an EX8200 Switch” on page 209.

To install a fan tray in an EX8208 switch, follow instructions in “Installing a Fan Tray in an EX8208 Switch” on page 154. To remove a fan tray from an EX8208 switch, follow instructions in “Removing a Fan Tray from an EX8208 Switch” on page 211.

To install a transceiver in an EX8208 switch, follow instructions in “Installing a Transceiver in an EX Series Switch” on page 163. To remove a transceiver from an EX8208 switch, follow instructions in “Removing a Transceiver from an EX Series Switch” on page 222.

- Related Topics**
- Field-Replaceable Units in an EX8208 Switch on page 23
  - EX8208 Switch Hardware Overview on page 3

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## Installing an AC Power Supply in an EX8200 Switch

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The AC power supply in an EX8200 switch is a hot-insertable and hot-removable field-replaceable unit (FRU). Up to six AC power supplies can be installed in an EX8200 switch. All AC power supplies install in the front of the chassis in the slots provided at the bottom. See “Slot Numbering for an EX8208 Switch” on page 13 and Slot Numbering for an EX8216 Switch.

Before you install an AC power supply in the switch:

- Ensure you understand how to prevent ESD damage. See “Prevention of Electrostatic Discharge Damage on EX Series Switches” on page 292.

Ensure that you have the following parts and tools available to install an AC power supply in an EX8200 switch chassis:

- Electrostatic discharge (ESD) grounding strap
- Phillips (+) screwdriver, number 1



**NOTE:** Each AC power supply must be connected to a dedicated AC power source outlet.

To install an AC power supply in an EX8200 switch (see Figure 52 on page 152):

1. Attach the electrostatic discharge (ESD) grounding strap to your bare wrist, and connect the strap to the ESD point on the chassis.
2. If the power supply slot has a cover panel on it, unscrew the screw on the side of the cover panel in the counterclockwise direction using the Phillips (+) screwdriver, number 1, and remove the cover panel. Save the cover panel for later use.
3. Taking care not to touch power supply components, pins, leads, or solder connections, remove the power supply from its bag.
4. Flip the **Enable** switch next to the appliance inlet on the power supply to the Standby position.
5. Unscrew the captive screw in the counterclockwise direction using the Phillips (+) screwdriver, number 1.
6. Pull the captive screw away from the faceplate of the power supply to release the latch.
7. Pull the handle away from the faceplate of the power supply until it is perpendicular to the faceplate.

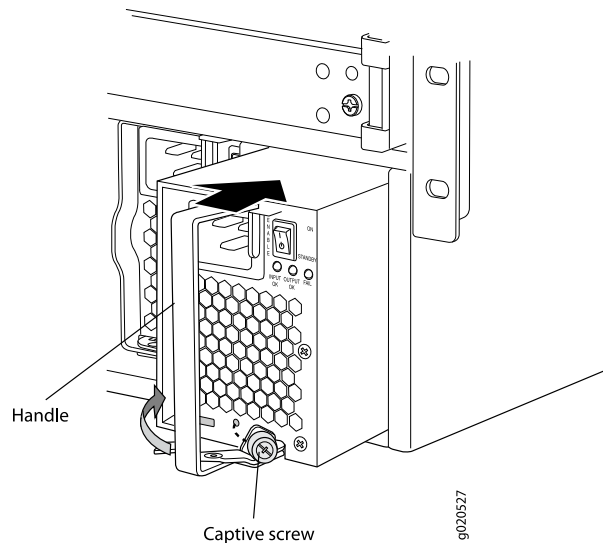


**NOTE:** Power supplies can be installed in any slot. You do not have to install the power supplies in serial order.

8. Using both hands, place the power supply in the power supply slot on the front of the switch. Slide the power supply straight into the chassis until the power supply is fully seated in the slot. Ensure the power supply faceplate is flush with any adjacent power supply faceplates or power supply cover panels.
9. Push the handle towards the faceplate of the power supply until it is flush against the faceplate.

10. Push the captive screw into the power supply faceplate. Ensure that the screw is seated inside the corresponding hole on the faceplate.
11. Tighten the captive screw by turning it clockwise using the Phillips (+) screwdriver, number 1. When the screw is completely tight, the latch locks into the switch chassis.

**Figure 52: Installing an AC Power Supply in an EX8200 Switch**



- Related Topics**
- Removing an AC Power Supply from an EX8200 Switch on page 207
  - Calculating Power Requirements for an EX8208 Switch on page 114
  - Calculating Power Requirements for an EX8216 Switch
  - Field-Replaceable Units in an EX8208 Switch on page 23
  - Field-Replaceable Units in an EX8216 Switch
  - AC Power Supply in an EX8200 Switch on page 40

## Installing a DC Power Supply in an EX8200 Switch

The DC power supply in an EX8200 switch is a hot-removable and hot-insertable field-replaceable unit (FRU). Up to six DC power supplies can be installed in an EX8200 switch. All DC power supplies install in the front of the chassis in the slots provided at the bottom. See “Slot Numbering for an EX8208 Switch” on page 13 and Slot Numbering for an EX8216 Switch.



**NOTE:** EX8208 switches support 2000 W DC power supplies.  
EX8216 switches support 3000 W DC power supplies.

Before you install a DC power supply in the switch:

- Ensure you understand how to prevent ESD damage. See “Prevention of Electrostatic Discharge Damage on EX Series Switches” on page 292.

Ensure that you have the following parts and tools available to install a DC power supply in an EX8200 switch chassis:

- Electrostatic discharge (ESD) grounding strap
- Phillips (+) screwdriver, number 1

To install a DC power supply in an EX8200 switch (see Figure 53 on page 154):

1. Attach the electrostatic discharge (ESD) grounding strap to your bare wrist, and connect the strap to the ESD point on the chassis.
2. If the power supply slot has a cover panel on it, unscrew the screw on the side of the cover panel in the counterclockwise direction using the Phillips (+) screwdriver, number 1, and remove the cover panel. Save the cover panel for later use.
3. Taking care not to touch power supply components, pins, leads, or solder connections, remove the power supply from its bag.
4. Flip the **Enable** switch on the power supply to the Standby position.
5. Unscrew the captive screw in the counterclockwise direction using the Phillips (+) screwdriver, number 1.
6. Pull the captive screw away from the faceplate of the power supply to release the latch.
7. Pull the handle away from the faceplate of the power supply until it is perpendicular to the faceplate.

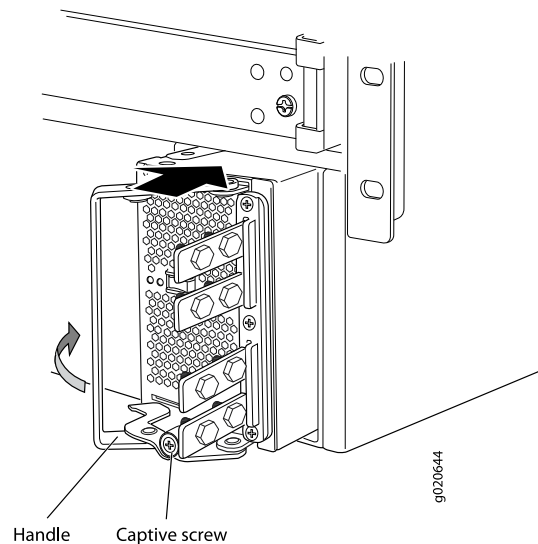


**NOTE:** Power supplies can be installed in any slot. You do not have to install the power supplies in serial order.

8. Using both hands, place the power supply in the power supply slot on the front of the switch. Slide the power supply straight into the chassis until the power supply is fully seated in the slot. Ensure the power supply faceplate is flush with any adjacent power supply faceplates or power supply cover panels.
9. Push the handle towards the faceplate of the power supply until it is flush against the faceplate.
10. Push the captive screw into the power supply faceplate. Ensure that the screw is seated inside the corresponding hole on the faceplate.
11. Tighten the captive screw by turning it clockwise using the Phillips (+) screwdriver, number 1. When the screw is completely tight, the latch locks into the switch chassis.

To connect power to a DC power supply, see “Connecting DC Power to an EX8200 Switch” on page 175

Figure 53: Installing a DC Power Supply in an EX8200 Switch



- Related Topics**
- Removing a DC Power Supply from an EX8200 Switch on page 209
  - DC Power Supply in an EX8200 Switch on page 48

## Installing a Fan Tray in an EX8208 Switch

An EX8208 switch has a single, field-replaceable fan tray. The fan tray is a hot-insertable and hot-removable field-replaceable unit (FRU); you can remove and replace the fan tray while the switch is running without turning off power to the switch or disrupting switching functions.

The fan tray installs vertically on the left side on the front of the chassis. A handle on the front faceplate facilitates handling of the fan tray. There is a spring-loaded latch on the base of the fan tray that is used to latch the fan tray into the chassis.

Before you begin to install a fan tray:

- Ensure you understand how to prevent ESD damage. See “Prevention of Electrostatic Discharge Damage on EX Series Switches” on page 292.

Ensure that you have the following parts and tools available to install a fan tray in an EX8208 switch:

- Electrostatic discharge (ESD) grounding strap



**CAUTION:** The fan tray can be removed and replaced while the switch is operating. However, the fan tray must be replaced within 2 minutes of removing the fan tray to prevent the chassis from overheating.

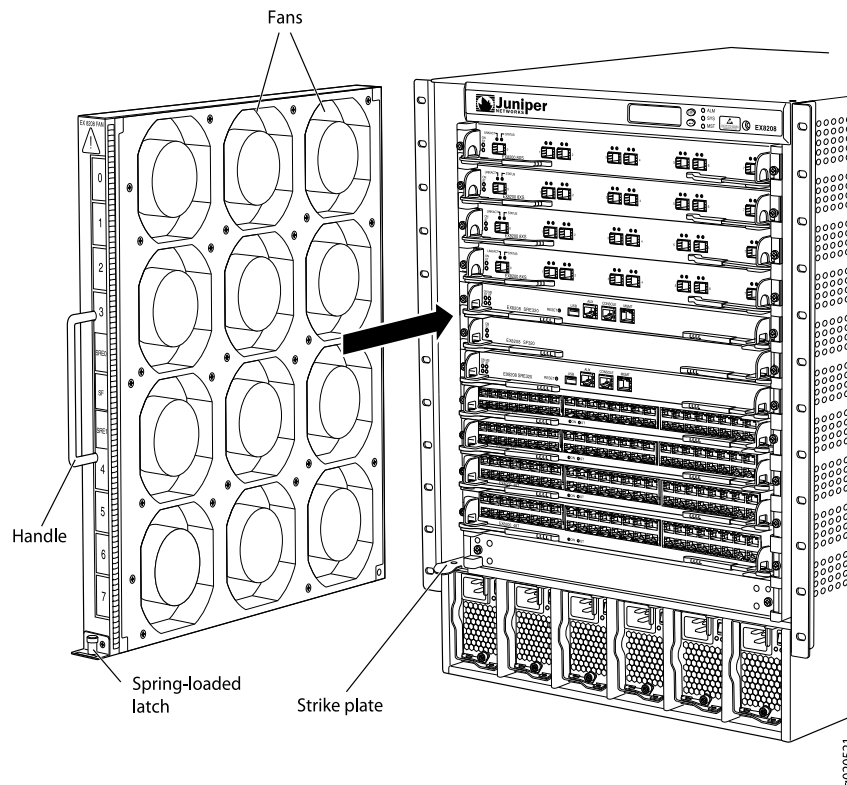
To install a fan tray in an EX8208 switch (see Figure 54 on page 155):



1. Attach the electrostatic discharge (ESD) grounding strap to your bare wrist, and connect the strap to the ESD point on the chassis.
2. Hold the handle of the fan tray with one hand and support the weight of the tray with the other hand. Align the tray with the fan tray guides on the fan tray slot. Slide in the fan tray until it is fully seated in the chassis.

You will hear a distinct click sound when the spring-loaded latch locks into the corresponding hole on the strike plate below the fan tray. The latch must be fully engaged in the corresponding hole for the fan tray to be securely installed.

**Figure 54: Installing a Fan Tray in an EX8208 Switch**



- Related Topics**
- Removing a Fan Tray from an EX8208 Switch on page 211
  - Cooling System and Airflow in an EX8208 Switch on page 53
  - Field-Replaceable Units in an EX8208 Switch on page 23

## Installing an SRE Module in an EX8208 Switch

You can install either one or two Switch Fabric and Routing Engine (SRE) modules in an EX8208 switch. The SRE modules install horizontally in the front of the chassis in the slots labeled SRE0 and SRE1.



NOTE: We recommend that you install two SRE modules for redundancy. If you install only one SRE module, we recommend that you install it in the slot SRE0.



CAUTION: Do not lift the SRE module by holding the ejector levers. The levers cannot support the weight of the module. Lifting the modules by the levers might bend the levers, and the bent levers will prevent the SRE module from being properly seated in the chassis.

Before you begin installing an SRE module in an EX8208 switch:

- Ensure you understand how to prevent ESD damage. See “Prevention of Electrostatic Discharge Damage on EX Series Switches” on page 292.

Ensure that you have the following parts and tools available to install an SRE module:

- Electrostatic discharge (ESD) grounding strap
- Phillips (+) screwdriver, number 2

To install an SRE module in an EX8208 switch (see Figure 55 on page 157):

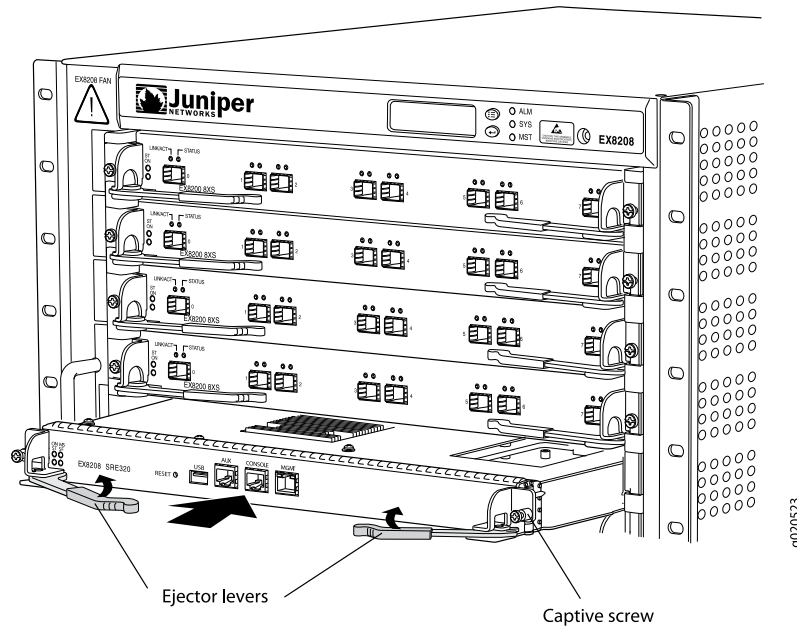
1. Attach the electrostatic discharge (ESD) grounding strap to your bare wrist and connect the strap to one of the ESD points on the chassis.
2. Taking care not to touch the leads, pins, or solder connections, pull the SRE module out from the bag.
3. Pull both the ejector levers outward, away from the faceplate of the SRE module, until they go no further.
4. If the slot has a cover panel on it, unscrew the two screws on either side of the cover panel counterclockwise using the Phillips (+) screwdriver, number 2. Remove the cover panel. Save the cover panel for later use.
5. Carefully align the sides of the SRE module with the guides inside the chassis.
6. Ensuring that the SRE module is correctly aligned, carefully slide it into the chassis until you feel resistance.
7. Push both the ejector levers towards the faceplate of the SRE module until the levers are flush against the faceplate and are fully engaged.
8. Tighten the screws, one on each side of the SRE module, by turning them clockwise using the Phillips (+) screwdriver, number 2. Ensure that the SRE module is fully seated in the chassis. It must be fully seated in order for it to be powered up.
9. Verify that the SRE module is installed correctly and functioning normally by checking the LEDs on the faceplate of the SRE module. The **ON** LED and **ST** LED should be lit steady green a few minutes after the SRE module is installed.

If the **ON** LED is unlit, verify that there are enough power supplies installed. See “Calculating Power Requirements for an EX8208 Switch” on page 114. If more power supplies are needed, install additional power supplies. See “Installing an AC Power

Supply in an EX8200 Switch” on page 150. If there are enough power supplies in the switch, remove and install the SRE module again. See “Removing an SRE Module from an EX8208 Switch” on page 215.

If the **ST** LED is lit steady yellow, the SRE module has failed. Remove the module and install a new SRE module. See “Removing an SRE Module from an EX8208 Switch” on page 215.

Figure 55: Installing an SRE Module in an EX8208 Switch



- Related Topics**
- Removing an SRE Module from an EX8208 Switch on page 215
  - Switch Fabric and Routing Engine (SRE) Module in an EX8208 Switch on page 24
  - SRE Module LEDs in an EX8208 Switch on page 26
  - Field-Replaceable Units in an EX8208 Switch on page 23

## Installing an SF Module in an EX8208 Switch

You can install either zero Switch Fabric (SF) modules or one SF module in an EX8208 switch depending on the switch configuration you want to have. One SF module is included in the base configuration. See “EX8208 Switch Configurations” on page 6.

The SF module can be installed only in the slot labeled SF. The SF module is keyed so that it does not fit in any other slot in the chassis.



**NOTE:** Do not lift the SF module by holding the ejector levers. The levers cannot support the weight of the module. Lifting the module by the levers might bend the levers. Bent levers prevent the SF module from being properly seated in the chassis.

Before you begin installing an SF module in an EX8208 switch:

- Ensure you understand how to prevent ESD damage. See “Prevention of Electrostatic Discharge Damage on EX Series Switches” on page 292.

Ensure that you have the following parts and tools available to install an SF module:

- Electrostatic discharge (ESD) grounding strap
- Phillips (+) screwdriver, number 2

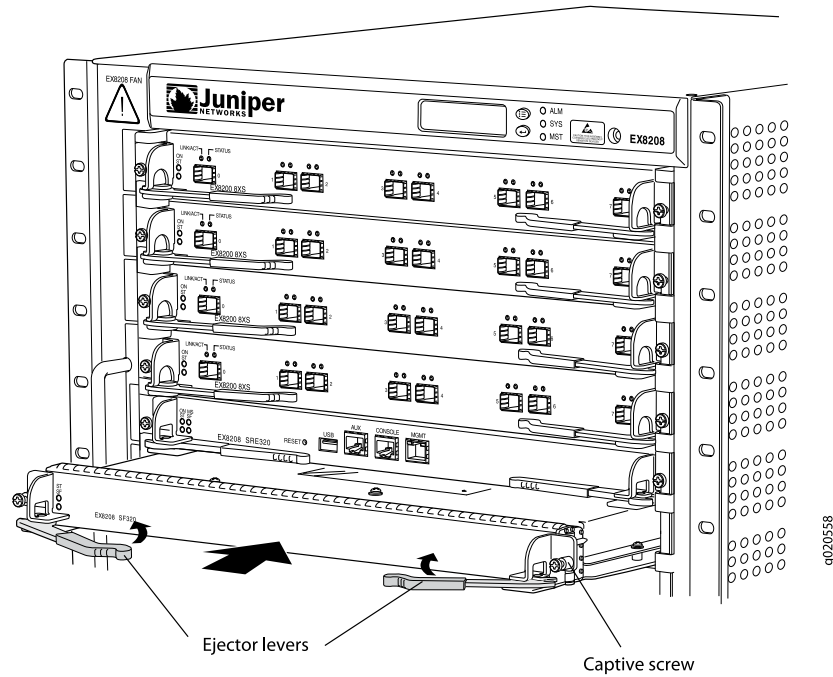
To install an SF module (see Figure 56 on page 159):

1. Attach the electrostatic discharge (ESD) grounding strap to your bare wrist and connect the strap to one of the ESD points on the chassis.
2. If the slot has a cover panel on it, use the Phillips (+) screwdriver, number 2 to remove the two screws on each side of the cover panel. Save the cover panel for later use.
3. Taking care not to touch the leads, pins, or solder connections, pull the SF module out from the bag.
4. Pull both the ejector levers outwards, away from the faceplate of the SF module, until they go no further.
5. Align the sides of the SF module with the guides inside the chassis.
6. Ensuring that the module remains correctly aligned, slide the SF module into the chassis until you feel resistance.
7. Push both the ejector levers towards the faceplate of the SF module until the levers are flush against the faceplate and are fully engaged.
8. Tighten the screws on each side of the SF module by turning them clockwise using the Phillips (+) screwdriver, number 2. Ensure that the SF module is fully seated in the chassis.
9. Verify that the SF module is installed correctly and functioning normally by checking the LEDs on the faceplate of the SF module. The **ST** LED and **SF** LED should be lit steady green a few minutes after the SF module is installed.

If the **ST** LED is unlit, check whether there are enough power supplies installed. See “Calculating Power Requirements for an EX8208 Switch” on page 114. If more power supplies are needed, install additional power supplies. See “Installing an AC Power Supply in an EX8200 Switch” on page 150. If there are enough power supplies in the switch, remove and install the SF module again. See “Removing an SF Module from an EX8208 Switch” on page 217.

If the **ST** LED or the **SF** LED is lit steady yellow, the SF module has failed. Remove the SF module and install a new one. See “Removing an SF Module from an EX8208 Switch” on page 217.

Figure 56: Installing an SF Module in an EX8208 Switch



- Related Topics**
- Removing an SF Module from an EX8208 Switch on page 217
  - Switch Fabric (SF) Module in an EX8208 Switch on page 28
  - SF Module LEDs in an EX8208 Switch on page 29
  - Field-Replaceable Units in an EX8208 Switch on page 23

## Unpacking a Line Card Used in an EX8200 Switch

The line cards for EX8200 switches are rigid sheet-metal structures that house the line card components including network ports. The line cards are shipped in a cardboard carton, secured with foam packing material.



**CAUTION:** The line cards are maximally protected inside the shipping carton. Do not unpack the line cards until you are ready to install them in the switch chassis.

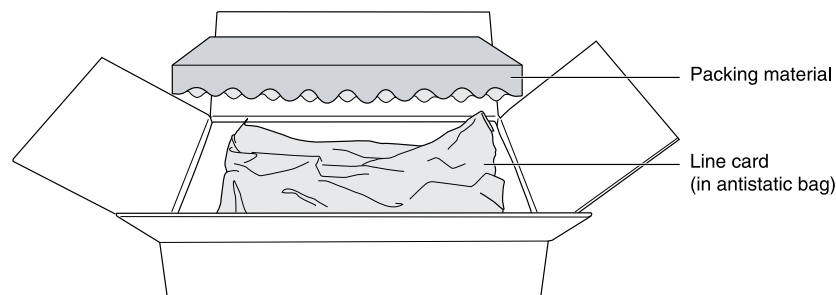
Before you unpack a line card:

- Ensure that you have taken the necessary precautions to prevent ESD damage (see “Prevention of Electrostatic Discharge Damage on EX Series Switches” on page 292).
- Ensure that you know how to handle and store the line card (see “Handling and Storing Line Cards in EX8200 Switches” on page 227).

To unpack a line card (see Figure 57 on page 160):

1. Move the shipping carton to a staging area as close to the installation site as possible.
2. Position the carton so that the arrows are pointing up.
3. Open the top flaps on the shipping carton.
4. Pull out the packing material, which holds the line card in place.
5. Remove the line card from the antistatic bag.
6. Save the shipping carton and packing materials in case you need to move or ship the line card later.

**Figure 57: Unpacking a Line Card Used in an EX8200 Switch**



- Related Topics**
- Packing a Line Card Used in an EX8200 Switch on page 259
  - Installing a Line Card in an EX8200 Switch on page 160
  - 8-port SFP+ Line Card in an EX8200 Switch on page 30
  - 40-port SFP+ Line Card in an EX8200 Switch on page 31
  - 48-port SFP Line Card in an EX8200 Switch on page 33
  - 48-port RJ-45 Line Card in an EX8200 Switch on page 34

## Installing a Line Card in an EX8200 Switch

EX8200 switches have field-replaceable unit (FRU) line cards that can be installed in the line card slots on the front of the switch chassis. The line cards are hot-insertable and hot-removable: You can remove and replace them without powering off the switch or disrupting switch functions.

Before you begin installing a line card in the switch:

- Ensure that you have taken the necessary precautions to prevent Electrostatic discharge (ESD) damage (see “Prevention of Electrostatic Discharge Damage on EX Series Switches” on page 292).
- If there are any transceivers installed in the line card, remove them before you install the line card. For instructions on removing transceivers, see “Removing a Transceiver from an EX Series Switch” on page 222.

- Ensure that you know how to handle and store the line card (see “Handling and Storing Line Cards in EX8200 Switches” on page 227).
- Ensure the switch has sufficient power to power the line card while maintaining its N+1 or N+N power configuration:
  - To determine the power requirements of the line card, see “Power Requirements for EX8208 Switch Components” on page 111 or Power Requirements for EX8216 Switch Components.
  - To determine whether the switch has enough power available for the line card, use the **show chassis power-budget-statistics** command if your switch is running Junos OS Release 10.2 or later. If your switch is running Junos OS Release 10.1 or earlier, see “Calculating Power Requirements for an EX8208 Switch” on page 114 or Calculating Power Requirements for an EX8216 Switch to calculate the available power.

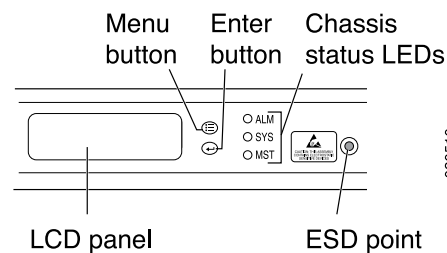
Ensure that you have the following parts and tools available to install a line card in the switch:

- ESD grounding strap
- Phillips (+) screwdriver, number 2

To install a line card in the switch:

1. Attach the ESD grounding strap to your bare wrist and connect the strap to the ESD point on the switch chassis (see Figure 58 on page 161). The ESD point is at the same location on EX8208 and EX8216 switches.

**Figure 58: Location of the ESD Point on an EX8200 Switch Chassis**



2. If the line card slot has a cover panel on it, use the screwdriver to remove the captive screws on each side of the cover panel. Save the cover panel and the screws for later use.

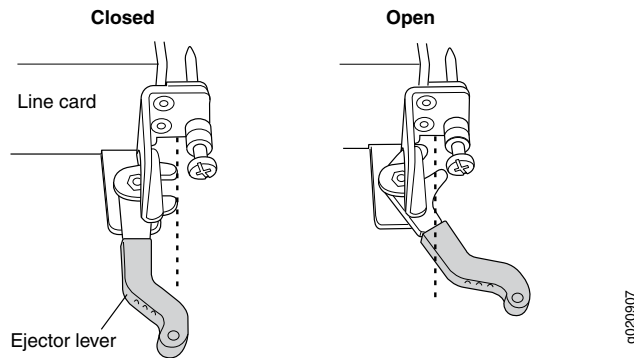


**CAUTION:** Do not lift the line card by holding the ejector levers on the faceplate or the edge connectors. The levers cannot support the weight of the line card. Lifting the line card by the levers might bend them. Bent levers prevent line cards from being properly seated in the chassis.

3. Taking care not to touch line card components, pins, leads, or solder connections, remove the line card from its bag.
4. Grasp the ejector levers on the faceplate of the line card and pull them outward until they are fully open. The closed and the open positions of the shorter ejector levers

are not as markedly distinguishable as those of the longer ones (see Figure 59 on page 162).

Figure 59: Closed and Open Positions of the 2-in. Ejector Lever



5. Place one hand around the faceplate of the line card and the other hand under the line card to support it.



**CAUTION:** The line cards in EX8200 switches weigh more than 10 lb (4.5 kg). Be prepared to support the full weight as you slide the line card into the chassis.

Before you slide the line card into the slot on the switch chassis, ensure the line card is aligned correctly. Misalignment might cause the pins to bend, making the line card unusable.

6. Lift the line card, and position it in the chassis with the faceplate facing you and the sides of the line card aligned with the guides in the line card slot on the switch chassis.
7. Make sure the levers stay in the open position (see Figure 59 on page 162) and gently slide the line card fully into the slot using both hands.



**NOTE:** You might need to lift the line card slightly to seat it correctly in the slot.

8. Grasp the ejector levers on the line card and push them inward simultaneously until the line card is fully seated (see Figure 60 on page 162 and Figure 61 on page 163).

Figure 60: Installing a Line Card with a 2-in. Ejector Lever

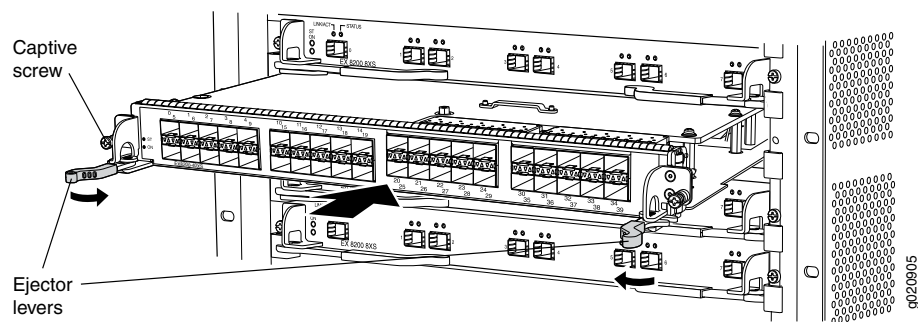
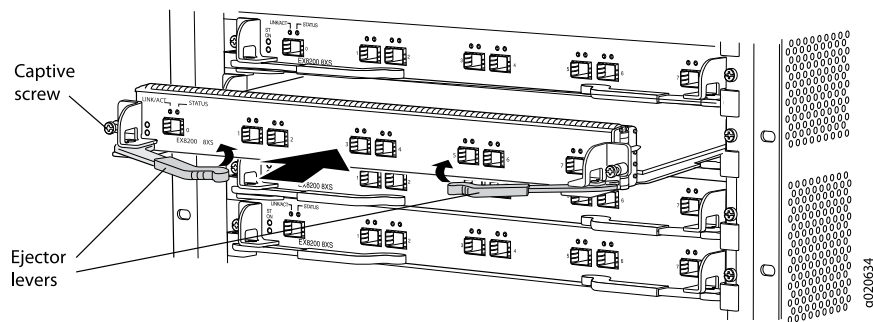




Figure 61: Installing a Line Card with a 4-in. Ejector Lever



9. Tighten the captive screws on the faceplate of the line card by using the screwdriver.
10. Verify that the **ON** LED starts blinking in green. When the **ON** LED is lit steadily, the line card is ready for use. If the **ON** LED does not blink or is not lit steadily, see “Troubleshooting Line Card Installation on EX8200 Switches” on page 237.



**CAUTION:** After the **ON** LED is lit steadily, wait for at least 30 seconds before installing another line card or removing a line card.

You can verify that the line card is functioning correctly by issuing the **show chassis fpc** and **show chassis fpc pic-status** commands.



**NOTE:** If you have a Juniper J-Care service contract, register any addition, change, or upgrade of hardware components at <https://www.juniper.net/customers/csc/management/updateinstallbase.jsp>. Failure to do so can result in significant delays if you need replacement parts. This note applies if you change the type of line card. It does not apply if you replace these components with the same type of component.

- Related Topics**
- Removing a Line Card from an EX8200 Switch on page 218
  - 8-port SFP+ Line Card in an EX8200 Switch on page 30
  - 40-port SFP+ Line Card in an EX8200 Switch on page 31
  - 48-port SFP Line Card in an EX8200 Switch on page 33
  - 48-port RJ-45 Line Card in an EX8200 Switch on page 34

## Installing a Transceiver in an EX Series Switch

The transceivers for EX Series switches are hot-removable and hot-insertable field-replaceable units (FRUs): You can remove and replace them without powering off the switch or disrupting switch functions.

Use only optical transceivers and optical connectors purchased from Juniper Networks for your EX Series switch.



NOTE: On an EX3200 switch, if you install a transceiver in a 1-gigabit uplink module port, a corresponding network port from the last four built-in ports is disabled. For example, if you install a transceiver in the 1-gigabit uplink module port 2 (ge-0/1/3), then built-in port 23 (ge-0/0/23) is disabled. The disabled port is not listed in the output of show interface commands.

Before you begin installing a transceiver in an EX Series switch, ensure that you have taken the necessary precautions for safe handling of lasers (see “Laser and LED Safety Guidelines and Warnings for EX Series Switches” on page 269).

Ensure that you have a rubber safety cap available to cover the transceiver.

Figure 62 on page 165 shows how to install an SFP transceiver. The procedure is the same for all transceiver types.

To install a transceiver in an EX Series switch:



CAUTION: To avoid electrostatic discharge (ESD) damage to the transceiver, do not touch the connector pins at the end of the transceiver.

1. Remove the transceiver from its bag.
2. Check to see whether the transceiver is covered by a rubber safety cap. If it is not, cover the transceiver with a rubber safety cap.



WARNING: Do not leave a fiber-optic transceiver uncovered except when inserting or removing a cable. The rubber safety cap keeps the port clean and prevents accidental exposure to laser light.

3. If the port in which you want to install the transceiver is covered with a dust cover, remove the dust cover and save it in case you need to cover the port later. If you are hot-swapping a transceiver, wait for at least 10 seconds after removing the transceiver from the port before installing a transceiver.
4. Using both hands, carefully place the transceiver in the empty port. The connectors must face the switch chassis.



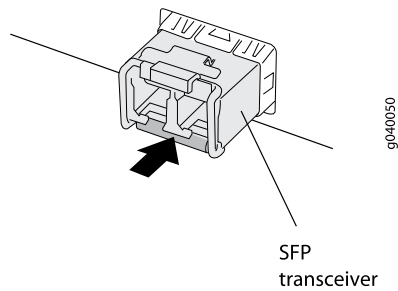
CAUTION: Before you slide the transceiver into the port, ensure the transceiver is aligned correctly. Misalignment might cause the pins to bend, making the transceiver unusable.

5. Slide the transceiver in gently until it is fully seated.
6. Remove the rubber safety cap when you are ready to connect the cable to the transceiver.



**WARNING:** Do not look directly into a fiber-optic transceiver or into the ends of fiber-optic cables. Fiber-optic transceivers and fiber-optic cables connected to transceivers emit laser light that can damage your eyes.

**Figure 62: Installing a Transceiver in an EX Series Switch**



- Related Topics**
- Removing a Transceiver from an EX Series Switch on page 222
  - Connecting a Fiber-Optic Cable to an EX Series Switch on page 165
  - Optical Interface Support in EX2200 Switches
  - Optical Interface Support in EX3200 and EX4200 Switches
  - Optical Interface Support in EX4500 Switches
  - Optical Interface Support in EX8200 Switches on page 60

## Connecting a Fiber-Optic Cable to an EX Series Switch

EX Series switches have field-replaceable unit (FRU) optical transceivers to which you can connect fiber-optic cables.

Before you begin connecting a fiber-optic cable to an optical transceiver installed in an EX Series switch, ensure that you have taken the necessary precautions for safe handling of lasers (see “Laser and LED Safety Guidelines and Warnings for EX Series Switches” on page 269).

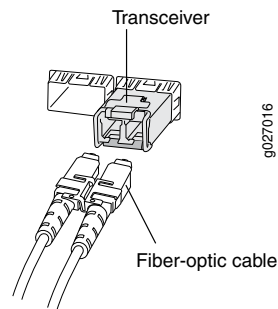
To connect a fiber-optic cable to an optical transceiver installed in an EX Series switch:



**WARNING:** Do not look directly into a fiber-optic transceiver or into the ends of fiber-optic cables. Fiber-optic transceivers and fiber-optic cables connected to transceivers emit laser light that can damage your eyes.

1. If the fiber-optic cable connector is covered by a rubber safety cap, remove the cap. Save the cap.
2. Remove the rubber safety cap from the optical transceiver. Save the cap.
3. Insert the cable connector into the optical transceiver (see Figure 63 on page 166).

**Figure 63: Connecting a Fiber-Optic Cable to an Optical Transceiver Installed in an EX Series Switch**



4. Secure the cables so that they are not supporting their own weight. Place excess cable out of the way in a neatly coiled loop. Placing fasteners on a loop helps cables maintain their shape.



**CAUTION:** Do not bend fiber-optic cables beyond their minimum bend radius. An arc smaller than a few inches in diameter can damage the cables and cause problems that are difficult to diagnose.

Do not let fiber-optic cables hang free from the connector. Do not allow fastened loops of cables to dangle, which stresses the cables at the fastening point.

#### Related Topics

- [Disconnecting a Fiber-Optic Cable from an EX Series Switch on page 221](#)
- [Installing a Transceiver in an EX Series Switch on page 163](#)
- [Maintaining Fiber-Optic Cables in EX Series Switches on page 231](#)
- [Optical Interface Support in EX2200 Switches](#)
- [Optical Interface Support in EX3200 and EX4200 Switches](#)
- [Optical Interface Support in EX4500 Switches](#)
- [Optical Interface Support in EX8200 Switches on page 60](#)

## CHAPTER 10

# Connecting the Switch

- Connecting Earth Ground to an EX Series Switch on page 167
- Connecting AC Power to an EX8200 Switch on page 173
- Connecting DC Power to an EX8200 Switch on page 175
- Powering On an EX8200 Switch on page 180
- Connecting an EX Series Switch to a Management Console on page 181
- Connecting an EX Series Switch to a Modem on page 183
- Connecting an EX Series Switch to a Network for Out-of-Band Management on page 187

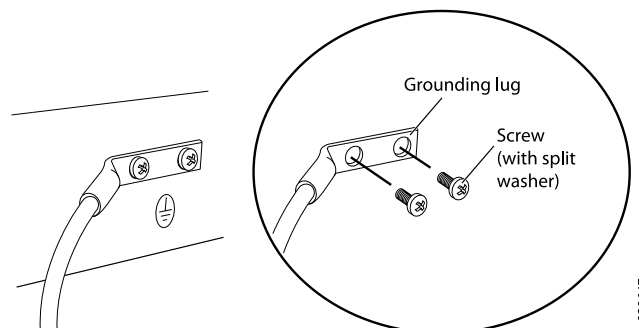
### Connecting Earth Ground to an EX Series Switch

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To meet safety and electromagnetic interference (EMI) requirements and to ensure proper operation, you must connect the switches to earth ground before you connect them to power.

For installations that require a separate grounding conductor to the chassis, use the protective earthing terminal on the EX Series switch chassis to connect to the earth ground (see Figure 64 on page 167).

**Figure 64: Connecting a Grounding Cable to an EX Series Switch**



Before you connect earth ground to the protective earthing terminal of an EX Series switch, ensure that a licensed electrician has attached an appropriate grounding lug to the grounding cable.



**CAUTION:** Using a grounding cable with an incorrectly attached lug can damage the switch.

Follow the procedure that applies to your switch:

- Connecting Earth Ground to an EX2200 or EX3200 Switch on page 168
- Connecting Earth Ground to an EX4200 Switch on page 169
- Connecting Earth Ground to an EX4500 Switch on page 170
- Connecting Earth Ground to an EX8208 Switch on page 171
- Connecting Earth Ground to an EX8216 Switch on page 172

### Connecting Earth Ground to an EX2200 or EX3200 Switch

The protective earthing terminal is located on the rear of the chassis in an EX2200 switch and in an EX3200 switch.

An AC-powered EX Series switch chassis gets additional grounding when you plug the power supply in the switch into a grounded AC power outlet by using an AC power cord appropriate for your geographical location. For EX2200 switches, see AC Power Cord Specifications for EX2200 Switches. For EX3200 switches, see AC Power Cord Specifications for EX3200 and EX4200 Switches.

Ensure that you have the following parts and tools available:

- Grounding cable for your switch—The grounding cable must be minimum 14 AWG (2 mm<sup>2</sup>), minimum 90°C wire, or as permitted by the local code.
- Grounding lug for your grounding cable—The grounding lug required is a Panduit LCD6-14BH-L or equivalent.
- Washers and 10-32x.25-in. screws to secure the grounding lug to the protective earthing terminal



**NOTE:** Some early models of EX3200 switches require 10-24x.25-in. screws rather than 10-32x.25-in. screws. If the Juniper Networks product number on the label next to the protective earthing terminal is from 750-021xxx through 750-030xxx, the switch requires 10-24x.25-in. screws.

- Phillips (+) screwdriver, number 2

To connect earth ground to an EX2200 or EX3200 switch:

1. Connect one end of the grounding cable to a proper earth ground, such as the rack in which the switch is mounted.
2. Place the grounding lug attached to the grounding cable over the protective earthing terminal. See Figure 64 on page 167.

3. Secure the grounding lug to the protective earthing terminal with screws.
4. Dress the grounding cable and ensure that it does not touch or block access to other switch components and that it does not drape where people could trip over it.

## Connecting Earth Ground to an EX4200 Switch

The protective earthing terminal is located on the left side of the chassis in an EX4200 switch.

An AC-powered EX Series switch chassis gets additional grounding when you plug the power supply in the switch into a grounded AC power outlet by using an AC power cord appropriate for your geographical location. See AC Power Cord Specifications for EX3200 and EX4200 Switches.

Ensure that you have the following parts and tools available:

- Grounding cable for your EX4200 switch—The grounding cable must be minimum 14 AWG (2 mm<sup>2</sup>), minimum 90°C wire, or as permitted by the local code.
- Grounding lug for your grounding cable—The grounding lug required is a Panduit LCD6-14BH-L or equivalent.
- Washers and 10-32x.25-in. screws to secure the grounding lug to the protective earthing terminal



**NOTE:** Some early models of EX4200 switches require 10-24x.25-in. screws rather than 10-32x.25-in. screws. If the Juniper Networks product number on the label next to the protective earthing terminal is from 750-021xxx through 750-030xxx, the switch requires 10-24x.25-in. screws.

- Phillips (+) screwdriver, number 2

To connect earth ground to an EX4200 switch:

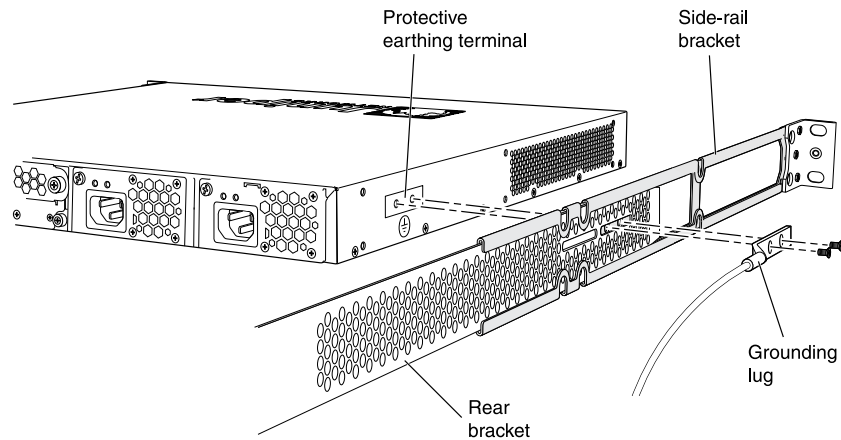
1. Connect one end of the grounding cable to a proper earth ground, such as the rack in which the switch is mounted.
2. Place the grounding lug attached to the grounding cable over the protective earthing terminal. See Figure 64 on page 167.

If you mounted an EX4200 switch on four posts of a rack using the four-post rack-mount kit, the protective earthing terminal on the switch is accessible through the slot on the left rear bracket. See Figure 65 on page 170.



**NOTE:** The protective earthing terminal on an EX4200 switch mounted on four posts is available only if the rack is 27.5 in. deep through 30.5 in. deep for a switch mounted flush with the rack front and 29.5 in. deep through 32.5 in. deep for a switch mounted 2 in. recessed from the rack front.

**Figure 65: Connecting the Grounding Lug to an EX4200 Switch on a Four-Post Rack**



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**NOTE:** The brackets must be attached to the chassis before the grounding lug is attached. (The brackets are shown pulled away from the chassis so that the protective earthing terminal can be seen.)

3. Secure the grounding lug to the protective earthing terminal with screws.
4. Dress the grounding cable and ensure that it does not touch or block access to other switch components and that it does not drape where people could trip over it.

## Connecting Earth Ground to an EX4500 Switch

The protective earthing terminal is located on the left rear of the chassis in an EX4500 switch.

An AC-powered EX Series switch chassis gets additional grounding when you plug the power supply in the switch into a grounded AC power outlet by using an AC power cord appropriate for your geographical location. See [AC Power Cord Specifications for an EX4500 Switch](#).



**NOTE:** If you plan to mount your switch on four posts of a rack or cabinet, mount your switch in the rack or cabinet before attaching the grounding lug to the switch. See [Mounting an EX4500 Switch on Four Posts in a Rack or Cabinet](#)

Ensure that you have the following parts and tools available:

- Grounding cable for your EX4500 switch—The grounding cable must be 14 AWG (2 mm<sup>2</sup>), minimum 90°C wire, or as permitted by the local code.
- Grounding lug for your grounding cable. See [Grounding Cable and Lug Specifications for EX4500 Switches](#).



- Washers and 10-32x.25-in. screws to secure the grounding lug to the protective earthing terminal
- Phillips (+) screwdriver, number 2

To connect earth ground to an EX4500 switch:

1. Connect one end of the grounding cable to a proper earth ground, such as the rack in which the switch is mounted.
2. Place the grounding lug attached to the grounding cable over the protective earthing terminal. See Figure 64 on page 167.



**NOTE:** If you mounted the switch on four posts of a rack using the four-post rack-mount kit, the protective earthing terminal on the switch is accessible through the slot on the left rear bracket.

The protective earthing terminal on the switch mounted on four posts is available only if the rack is 27.5 in. deep through 30.5 in. deep for a switch mounted flush with the rack front and 29.5 in. deep through 32.5 in. deep for a switch mounted 2 in. recessed from the rack front.

3. Secure the grounding lug to the protective earthing terminal with screws.
4. Dress the grounding cable and ensure that it does not touch or block access to other switch components and that it does not drape where people could trip over it.

## Connecting Earth Ground to an EX8208 Switch

The protective earthing terminal is located on the left side of the chassis in an EX8208 switch.

An AC-powered EX Series switch chassis gets additional grounding when you plug the power supply in the switch into a grounded AC power outlet by using an AC power cord appropriate for your geographical location. See “AC Power Cord Specifications for an EX8200 Switch” on page 112.

Ensure that you have the following parts and tools available:

- Grounding cable for your EX8208 switch—The grounding cable must be 6 AWG (13.3 mm<sup>2</sup>), minimum 60°C wire, or as permitted by the local code.
- Grounding lug for your grounding cable. See “Grounding Cable and Lug Specifications for EX8200 Switches” on page 87.
- Washers and ¼-20x.75-in. screws to secure the grounding lug to the protective earthing terminal
- Phillips (+) screwdriver, number 2

To connect earth ground to an EX8208 switch:

1. Connect one end of the grounding cable to a proper earth ground, such as the rack in which the switch is mounted.
2. Place the grounding lug attached to the grounding cable over the protective earthing terminal. See Figure 64 on page 167.
3. Secure the grounding lug to the protective earthing terminal with screws.
4. Dress the grounding cable and ensure that it does not touch or block access to other switch components and that it does not drape where people could trip over it.

## Connecting Earth Ground to an EX8216 Switch

There are two protective earthing terminals on an EX8216 switch: one on the left side of the chassis and the other on the rear of the chassis. Only one of the two protective earthing terminals needs to be permanently connected to earth ground.

An AC-powered EX Series switch chassis gets additional grounding when you plug the power supply in the switch into a grounded AC power outlet by using an AC power cord appropriate for your geographical location. See “AC Power Cord Specifications for an EX8200 Switch” on page 112.

Ensure that you have the following parts and tools available:

- Grounding cable for your EX8216 switch—The grounding cable must be 2 AWG (33.6 mm<sup>2</sup>), minimum 60°C wire, or as permitted by the local code.
- Grounding lug for your grounding cable. See “Grounding Cable and Lug Specifications for EX8200 Switches” on page 87.
- Washers and ¼-20x.5/8-in. screws to secure the grounding lug to the protective earthing terminal
- Phillips (+) screwdriver, number 2

To connect earth ground to an EX8216 switch:

1. Connect one end of the grounding cable to a proper earth ground, such as the rack in which the switch is mounted.
2. Place the grounding lug attached to the grounding cable over the protective earthing terminal. See Figure 64 on page 167.
3. Secure the grounding lug to the protective earthing terminal with screws.
4. Dress the grounding cable and ensure that it does not touch or block access to other switch components and that it does not drape where people could trip over it.

### Related Topics

- Connecting AC Power to an EX2200 Switch
- Connecting AC Power to an EX3200 or EX4200 Switch
- Connecting DC Power to an EX3200 or EX4200 Switch
- Connecting AC Power to an EX4500 Switch
- Connecting AC Power to an EX8200 Switch on page 173

- Connecting DC Power to an EX8200 Switch on page 175
- General Safety Guidelines and Warnings for EX Series Switches on page 263
- Grounded Equipment Warning for EX Series Switches on page 282

## Connecting AC Power to an EX8200 Switch

EX8200 switches can be configured with up to six AC power supplies. After you have installed at least one power supply, you can connect power to the switch.



**CAUTION:** Mixing different types of power supplies in the same chassis is not a supported configuration.



**NOTE:** Each power supply must be connected to a dedicated AC power source outlet.

Before you begin to connect power to the switch:

- Ensure you understand how to prevent ESD damage. See “Prevention of Electrostatic Discharge Damage on EX Series Switches” on page 292.
- Ensure that you have connected the switch chassis to earth ground.



**CAUTION:** To meet safety and electromagnetic interference (EMI) requirements and to ensure proper operation, EX8200 switches must be adequately grounded before they are connected to power.

For installations that require a separate grounding conductor to the chassis, use the protective earthing terminal on the EX8200 switch chassis to connect to the earth ground. For instructions on connecting an EX8200 switch to ground using a separate grounding conductor, see “Connecting Earth Ground to an EX Series Switch” on page 167.

An EX8200 switch gets additional grounding when you plug the power supply in the switch into a grounded AC power outlet by using the AC power cord appropriate for your geographical location. See “AC Power Cord Specifications for an EX8200 Switch” on page 112.

- Install power supplies in the switch. See “Installing an AC Power Supply in an EX8200 Switch” on page 150.

Ensure that you have the following parts and tools available to connect power to the switch:

- Electrostatic discharge (ESD) grounding strap
- Power cords appropriate for your geographical location. See “AC Power Cord Specifications for an EX8200 Switch” on page 112.

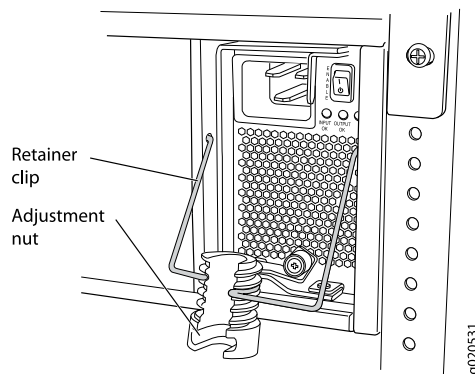


**WARNING:** Ensure that the power cords do not block access to switch components or drape where people can trip on them.

To connect AC power to an EX8200 switch:

1. Attach the electrostatic discharge (ESD) grounding strap to your bare wrist, and connect the strap to the ESD point on the chassis.
2. Ensure that the power supply is fully inserted and latched securely in the chassis. See “Installing an AC Power Supply in an EX8200 Switch” on page 150.
3. Flip the **Enable** switch, which is next to the appliance inlet on the power supply faceplate, to the Standby position.
4. Squeeze the two sides of the power cord retainer clip, and insert the L-shaped ends of the clip into the holes in the bracket on each side of the AC appliance inlet on the AC power supply faceplate. See Figure 66 on page 174.

**Figure 66: Power Cord Retainer in an AC Power Supply**



5. Locate the power cord or cords shipped with the switch; the cords have plugs appropriate for your geographical location.
6. Insert the coupler end of the power cord into the AC appliance inlet on the AC power supply faceplate.

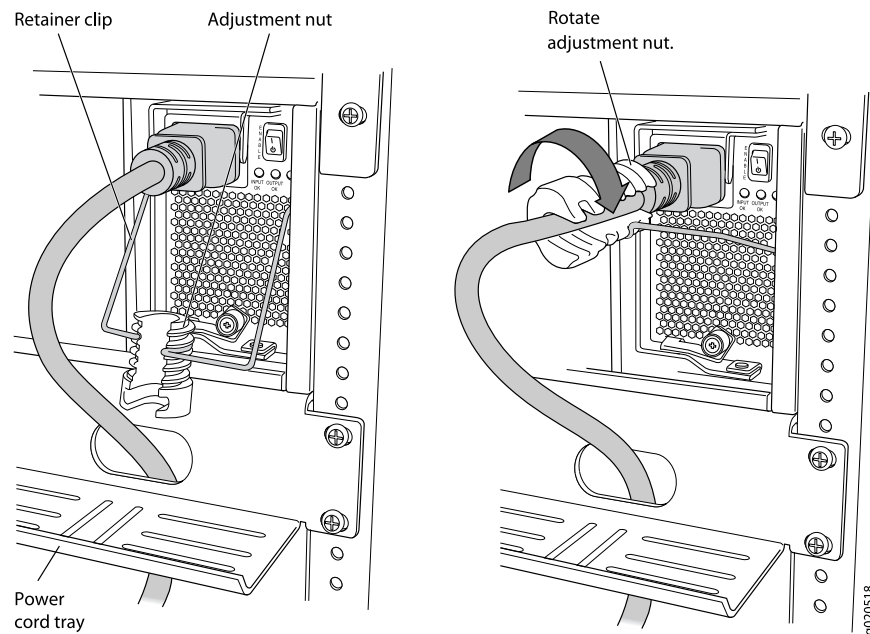


**NOTE:** If the power cord tray is installed, you can thread the power cord through the power cord tray. See Figure 67 on page 175.

7. Push the cord (close to the coupler end) into the slot in the adjustment nut of the power cord retainer. Rotate the nut until it is tight against the base of the coupler and the slot in the nut is turned 90° from the top of the switch. See Figure 67 on page 175.
8. If the AC power source outlet has a power switch, set it to the OFF (O) position.
9. Insert the power cord plug into an AC power source outlet.
10. If the AC power source outlet has a power switch, set it to the ON (I) position.

11. Verify that the **INPUT OK** LED on the power supply faceplate is lit and is on steadily.
12. Repeat steps 2 through 11 for the remaining power supplies.

**Figure 67: Connecting the Power Supply Cord to an EX8200 Switch**



- Related Topics**
- Powering On an EX8200 Switch on page 180
  - AC Power Supply in an EX8200 Switch on page 40
  - AC Power Supply LEDs in an EX8200 Switch on page 46

## Connecting DC Power to an EX8200 Switch

An EX8200 switch can be configured with up to six DC power supplies. After you have installed at least one power supply, you can connect power to the switch.



**WARNING:** Before performing DC power procedures, ensure that power is removed from the DC circuit. To ensure that all power is off, locate the circuit breaker on the panel board that services the DC circuit, switch the circuit breaker to the OFF position, and tape the switch handle of the circuit breaker in the OFF position.



**NOTE:** EX8208 switches support 2000 W DC power supplies. EX8216 switches support 3000 W DC power supplies.



CAUTION: Before you connect power to the switch, a licensed electrician must attach a cable lug to the grounding and power cables that you supply. A cable with an incorrectly attached lug can damage the switch (for example, by causing a short circuit).



CAUTION: Mixing different types of power supplies in the same chassis is not a supported configuration.



NOTE: A 2000 W DC power supply requires a dedicated 60 A circuit breaker for each input DC feed.

A 3000 W DC power supply requires a dedicated 100 A circuit breaker for each input DC feed.



NOTE: Each power supply input feed must be connected to a dedicated DC power source outlet.

Before you begin connecting DC power to an EX8200 switch:

- Ensure that you have taken the necessary precautions to prevent ESD damage (see “Prevention of Electrostatic Discharge Damage on EX Series Switches” on page 292).
- Ensure that you have connected the switch chassis to earth ground.



CAUTION: To meet safety and electromagnetic interference (EMI) requirements and to ensure proper operation, you must connect EX8200 switches to earth ground before you connect them to power. For installations that require a separate grounding conductor to the chassis, use the protective earthing terminal on the switch chassis to connect to earth ground. For instructions on connecting an EX8200 switch to ground using a separate grounding conductor, see “Connecting Earth Ground to an EX Series Switch” on page 167.

- Install the power supply in the chassis. See “Installing a DC Power Supply in an EX8200 Switch” on page 152.

Ensure that you have the following parts and tools available to connect DC power to an EX8200 switch:

- Electrostatic discharge (ESD) grounding strap
- DC power source cables (not provided) with the cable lugs (provided) attached.

The provided cable lugs in an EX8208 switch are sized for 6 AWG (13.3 mm<sup>2</sup>) power source cables. The DC power source cables that you provide must be 6 AWG (13.3 mm<sup>2</sup>), minimum 60°C wire. We recommend that you install heat-shrink tubing insulation around the power cables and lugs.

The provided cable lugs in an EX8216 switch are sized for 2 AWG (33.6 mm<sup>2</sup>) power source cables. The DC power source cables that you provide must be 2 AWG (33.6 mm<sup>2</sup>), minimum 60°C wire. We recommend that you install heat-shrink tubing insulation around the power cables and lugs.

- 3/8 in. (9.5 mm) nut driver or socket wrench
- Phillips (+) screwdriver, number 2
- Multimeter



**WARNING:** Ensure that the power cords do not block access to switch components or drape where people can trip on them.

To connect DC power to an EX8200 switch:

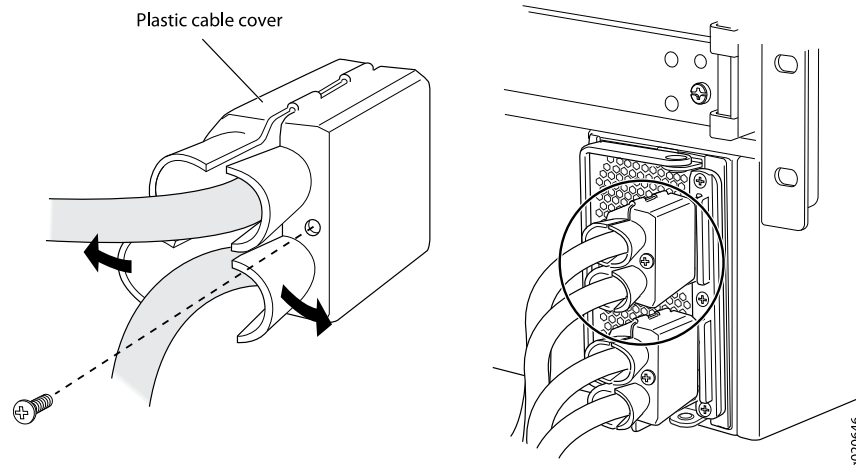
1. Attach the electrostatic discharge (ESD) grounding strap to your bare wrist, and connect the strap to the ESD point on the chassis.
2. Flip the **Enable** switch on the power supply faceplate to the Standby position.



**NOTE:** It might be necessary to slide each power supply partially out of the chassis, in order to easily connect the DC power source cables to the DC power input terminals. See “Removing a DC Power Supply from an EX8200 Switch” on page 209.

3. Remove the plastic cable cover from the DC power input terminals, using the number 2 Phillips (+) screwdriver to loosen the screw (see Figure 68 on page 177).

**Figure 68: Removing the Plastic Cable Cover on a DC Power Supply in an EX8200 Switch**



4. Remove the washers and nuts from each DC power input terminal, using the 3/8-in. (9.5 mm) nut driver or socket wrench to loosen the nuts. Leave the bolts installed on the input terminals.

5. Ensure that the power source circuit breaker is open so that the voltage across the DC power source cable leads is 0 V and that the cable leads do not become active while you are connecting DC power.
6. Verify that the DC power cables are correctly labeled before making connections to the power supply. In a typical power distribution scheme where the return is connected to chassis ground at the battery plant, you can use a multimeter to verify the resistance of the **-48V** and **RTN** DC cables to chassis ground:
  - The cable with very high resistance (indicating an open circuit) to chassis ground is negative (-) and will be installed on the **-48V** (input) DC power input terminal.
  - The cable with very low resistance (indicating a closed circuit) to chassis ground is positive (+) and will be installed on the **RTN** (return) DC power input terminal.



**CAUTION:** You must ensure that power connections maintain the proper polarity. The power source cables might be labeled (+) and (-) to indicate their polarity. There is no standard color coding for DC power cables. The color coding used by the external DC power source at your site determines the color coding for the leads on the power cables that attach to the DC power input terminals on each power supply.

---

7. Install each power cable lug on the DC power input terminal, securing it first with a locking washer, then with the nut (see Figure 69 on page 179). Apply between 29 in.-lb (3.3 Nm) and 31 in.-lb (3.5 Nm) of torque to each nut. (Use the 3/8-in. [9.5 mm] nut driver or socket wrench.)
  - a. Secure each positive (+) DC source power cable lug to the **RTN** (return) DC power input terminal.
  - b. Secure each negative (-) DC source power cable lug to the **-48V** (input) DC power input terminal.

Each power supply has two independent sets of DC power input terminals (A: -48V A: RTN and B: -48V B: RTN ). For feed redundancy, each power supply should be powered by dedicated power feeds derived from feed A and feed B. This configuration provides the commonly deployed **A/B** feed redundancy for the switch.

---

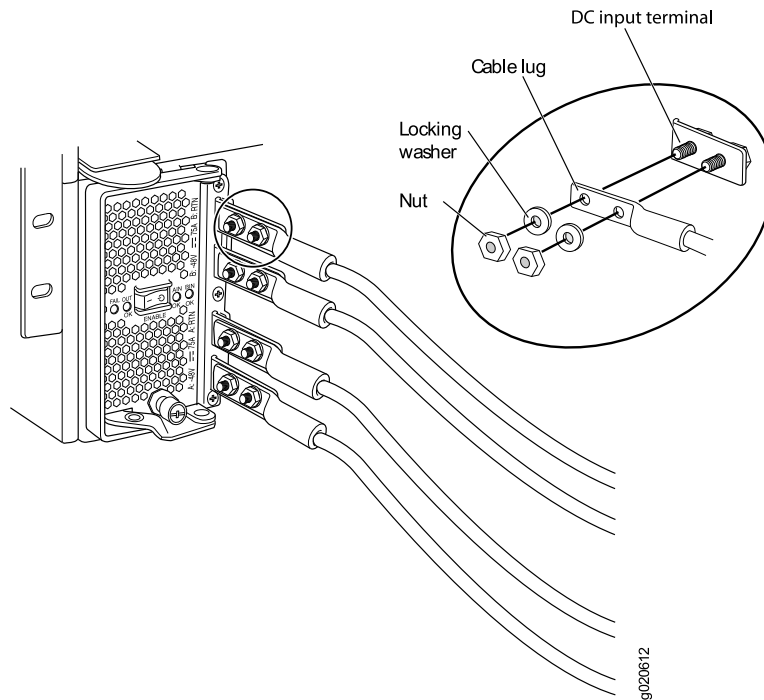


**NOTE:** If the power cord tray is installed, you can thread the DC power cables through the power cord tray.

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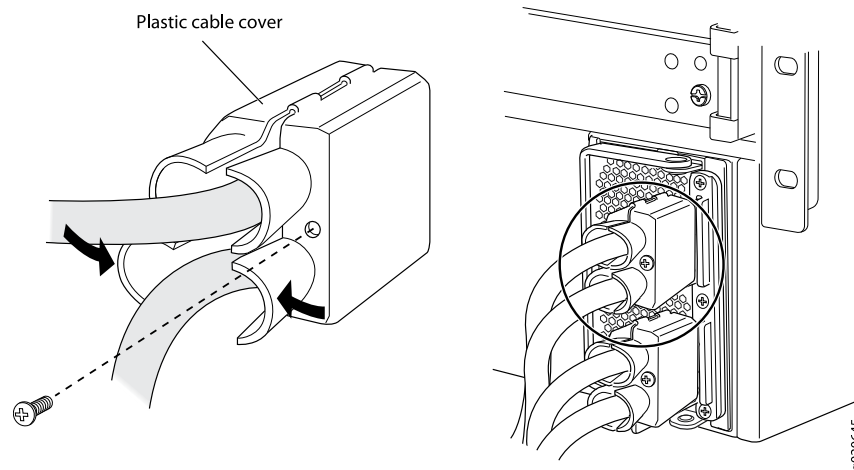


Figure 69: Connecting the Power Supply Cables to an EX8200 Switch



8. Install the plastic cable cover over each set of power cables, using the number 2 Phillips (+) screwdriver to tighten the screw (see Figure 70 on page 179).

Figure 70: Installing the Plastic Cable Cover on a DC Power Supply in an EX8200 Switch



9. Ensure that the power supply is fully inserted and latched securely in the chassis. See “Installing a DC Power Supply in an EX8200 Switch” on page 152.
10. Repeat Steps 2 through 9 for the remaining power supplies.

**Related Topics** • Powering On an EX8200 Switch on page 180

- DC Power Supply in an EX8200 Switch on page 48
- DC Power Supply LEDs in an EX8200 Switch on page 50

## Powering On an EX8200 Switch

---

Before you power on the switch, ensure that:

- You have installed all required switch components.
- You have installed the required number of power supplies to support redundant operation for the switch configuration (see “Calculating Power Requirements for an EX8208 Switch” on page 114 or Calculating Power Requirements for an EX8216 Switch).
- You understand how to protect the switch from electrostatic damage. See “Prevention of Electrostatic Discharge Damage on EX Series Switches” on page 292.

Ensure that you have the following parts and tools available to power on the switch:

- An electrostatic discharge (ESD) grounding strap.
- An external management device such as a PC.
- A cable to connect the external management device to the master Switch Fabric and Routing Engine (SRE) module's console (CON) port or management (MGMT) port in an EX8208 switch or the master Routing Engine (RE) module's console (CON) port or management (MGMT) port in an EX8216 switch.

For connecting a management device to the console port, see “Connecting an EX Series Switch to a Management Console” on page 181. For connecting a management device to the management port, see “Connecting an EX Series Switch to a Network for Out-of-Band Management” on page 187.

To power on the switch:

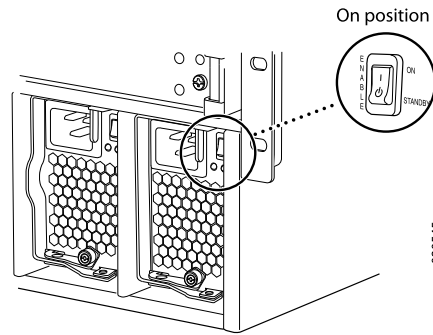
1. Attach the ESD grounding strap to your bare wrist and connect the strap to the ESD point on the chassis.
2. Connect the external management device to the master SRE or master RE module's management (MGMT) port.
3. Turn on the power to the external management device.
4. Ensure that the power supplies are fully inserted in the chassis and that each of their handles is flush against the faceplate.
5. Ensure that the source power cord is inserted securely into the appliance inlet for each AC power supply.

If you are using DC power supplies, ensure that the source power cables are connected to the appropriate terminal: the positive (+) source cable to the return terminal (RTN) and the negative (-) source cable to the input terminal (-48 VDC).

6. Switch on the site circuit breakers.

7. Flip a power supply's **Enable** switch to the on position (ON). See Figure 71 on page 181. Observe the power supply faceplate LEDs. If the power supply is installed correctly and functioning normally, the **INPUT OK / IN OK** and **OUTPUT OK / OUT OK** LEDs light and remain constantly lit. The **FAIL** LED does not light.

**Figure 71: Flip the Enable Switch to the ON position**



8. Repeat Step 7 for the remaining power supplies installed in the switch.
9. On the external management device, monitor the startup process to ensure that the system boots properly.



**NOTE:** After you power on a power supply, wait for at least 60 seconds before you turn it off. After you power off a power supply, wait for at least 60 seconds before you turn it back on.

If the system is completely powered off when you switch on a power supply, the SRE or RE module boots as the power supply completes its startup sequence.

After you power on a power supply, it can take up to 60 seconds for status indicators such as power supply LEDs and the show chassis operational mode CLI command display to indicate that the power supply is functioning normally. Ignore any error indicators that might appear during the first 60 seconds.

- Related Topics**
- Installing an AC Power Supply in an EX8200 Switch on page 150
  - Installing a DC Power Supply in an EX8200 Switch on page 152
  - Connecting AC Power to an EX8200 Switch on page 173
  - Connecting DC Power to an EX8200 Switch on page 175
  - Powering Off an EX8200 Switch on page 199

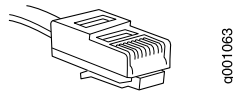
## Connecting an EX Series Switch to a Management Console

You can configure and manage an EX Series switch using a dedicated console. Every EX Series switch has a console port with an RJ-45 connector. Use the console port to connect the EX Series switch to the management console or to a console server. The console port accepts a cable with an RJ-45 connector.

Ensure that you have an Ethernet cable with an RJ-45 connector available. An RJ-45 cable and an RJ-45 to DB-9 serial port adapter are supplied with the switch.

Figure 72 on page 182 shows the RJ-45 connector of the Ethernet cable supplied with the switch.

**Figure 72: Ethernet Cable Connector**



**NOTE:** If your laptop or PC does not have a DB-9 male connector pin and you want to connect your laptop or PC directly to an EX Series switch, use a combination of the RJ-45 to DB-9 female adapter supplied with the switch and a USB to DB-9 male adapter. You must provide the USB to DB-9 male adapter.

To connect an EX Series switch to a management console (see Figure 73 on page 182 and Figure 74 on page 183):

1. Connect one end of the Ethernet cable into the console port (labeled **CON** or **CONSOLE**) on the EX Series switch.

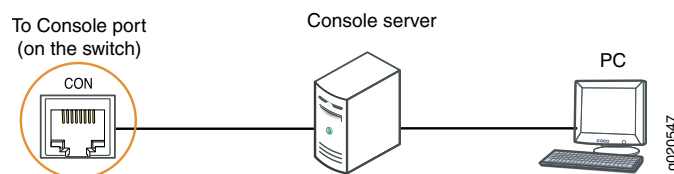
For the location of the **CON/CONSOLE** port on different EX Series switches:

- See Rear Panel of an EX2200 Switch.
- See Rear Panel of an EX3200 Switch.
- See Rear Panel of an EX4200 Switch.
- See Front Panel of an EX4500 Switch.
- See “Switch Fabric and Routing Engine (SRE) Module in an EX8208 Switch” on page 24.
- See Routing Engine (RE) Module in an EX8216 Switch.

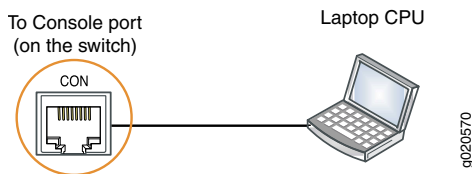
2. Connect the other end of the Ethernet cable into the console server (see Figure 73 on page 182) or management console (see Figure 74 on page 183).

To configure the switch from the management console, see “Connecting and Configuring an EX Series Switch (CLI Procedure)” on page 190 or “Connecting and Configuring an EX Series Switch (J-Web Procedure)” on page 192.

**Figure 73: Connecting an EX Series Switch to a Management Console Through a Console Server**



**Figure 74: Connecting an EX Series Switch Directly to a Management Console**



- Related Topics**
- Connecting an EX Series Switch to a Network for Out-of-Band Management on page 187
  - Console Port Connector Pinout Information for an EX Series Switch on page 58
  - Cables Connecting the EX8200 Switch to Management Devices on page 105

## Connecting an EX Series Switch to a Modem

You can connect an EX Series switch to a modem through the console port on the switch.

Before you connect the switch to a modem:

- Perform the initial setup and configuration of the switch. See “Connecting and Configuring an EX Series Switch (CLI Procedure)” on page 190 or “Connecting and Configuring an EX Series Switch (J-Web Procedure)” on page 192.

Ensure that you have the following parts available before you begin to connect the switch to the modem:

- A modem (not provided)
- A desktop or notebook computer (not provided)
- An RJ-45 to DB-9 adapter and an Ethernet cable (provided)
- A phone cable (not provided)
- If your computer does not have a DB-9 male connector pin, a USB to DB-9 male adapter (not provided)
- An adapter to connect the RS-232 DB-25 connector on the modem to the RJ-45 to DB-9 adapter on the switch (not provided)

This topic describes:

1. Setting the Serial Console Speed for the Switch on page 183
2. Configuring the Modem on page 184
3. Connecting the Modem to the Console Port on page 185

### Setting the Serial Console Speed for the Switch

Before you can connect the switch to a modem, the switch’s serial console speed must be set to 115200 baud.



NOTE: The default serial console speed is 9600 baud.

To change the serial console speed:

1. Power on the switch. (If the switch is an EX8208 or EX8216 model, see “Powering On an EX8200 Switch” on page 180.) The loader script starts.
2. You are prompted with:

Hit [Enter] to boot immediately, or space bar for command prompt.

Press the Spacebar to pause the switch in the loader state (after the Junos OS has loaded on the switch but before the software starts).

The **loader>** prompt appears.

3. Set the baud rate:

```
loader> set baudrate=115200
```

Press Enter.

4. Press Enter when you see the following message:

Switch baud rate to 115200 bps and press Enter.

The **loader>** prompt reappears.

5. Save the new serial console speed:

```
loader> save
```

Press Enter. The serial console speed is now set to 115200 baud.

6. Boot the software:

```
loader> boot
```

The boot process proceeds as normal and ends with a login prompt.

## Configuring the Modem

Before you connect the modem, you must configure the modem with required port settings.



NOTE: The following procedure uses Hayes-compatible-modem commands to configure the modem. If your modem is not Hayes-compatible, see the documentation for your modem for the equivalent modem commands.

To configure the modem:

1. Connect the modem to the desktop or notebook computer.
2. Power on the modem.

3. From the computer, start your asynchronous terminal emulation application (such as Microsoft Windows HyperTerminal) and select the COM port to which the modem is connected (for example, COM1).
4. Configure the port settings shown in Table 54 on page 185.

Table 54: Port Settings

Port Settings	Value
Bits per second	115200
Data bits	8
Parity	None
Stop bits	1
Flow control	None

5. In the HyperTerminal window, type **at**. Press Enter.  
The modem sends an OK response to verify that it can communicate successfully with the COM port on your desktop or notebook computer.
6. To configure the modem to answer a call on the first ring, type **ats0=1** at the prompt. Press Enter.
7. To configure the modem to accept modem-control DTR signals, type **at&d1** at the prompt. Press Enter.
8. To disable flow control on the modem, type **at&k0** at the prompt. Press Enter.
9. To set the fixed serial port speed on the modem, type **at&b1** at the prompt. Press Enter.



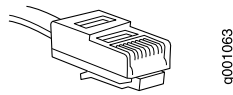
**NOTE:** You must set the serial port to the fixed speed so that the modem will not adjust the serial port speed to the negotiated line speed.

10. To save the new modem settings, type **at&w0** at the prompt. Press Enter.  
The modem sends an OK message. The modem is now ready to be connected to the switch.

### Connecting the Modem to the Console Port

The console port on every EX Series switch accepts a cable with an RJ-45 connector. Figure 75 on page 186 shows the RJ-45 connector of the Ethernet cable supplied with the switch.

Figure 75: Ethernet Cable Connector



NOTE: If your laptop or PC does not have a DB-9 male connector pin and you want to connect your laptop or PC directly to the switch, use a combination of the RJ-45 to DB-9 female adapter supplied with the switch and a USB to DB-9 male adapter. You must provide the USB to DB-9 male adapter.



NOTE: Most modems have an RS-232 DB-25 connector. You must separately purchase an adapter to connect your modem to the RJ-45 to DB-9 adapter and Ethernet cable supplied with the switch.

To connect a modem to the console port:

1. Turn off power to the switch.
2. Turn off power to the modem.
3. Connect one end of the cable to the console port (labeled **CON** or **CONSOLE**) on the switch.

For the location of the console port on different EX Series switches:

- See Rear Panel of an EX2200 Switch.
  - See Rear Panel of an EX3200 Switch.
  - See Rear Panel of an EX4200 Switch.
  - See Front Panel of an EX4500 Switch.
  - See “Switch Fabric and Routing Engine (SRE) Module in an EX8208 Switch” on page 24.
  - See Routing Engine (RE) Module in an EX8216 Switch.
4. Connect the other end of the cable to the RJ-45 to DB-9 serial port adapter supplied with your switch.
  5. Connect the serial port adapter to the DB-9 female to DB-25 male adapter or other adapter appropriate for your modem.
  6. Plug the modem adapter into the DB-25 connector on the modem.
  7. Connect one end of the phone cable to the modem and the other end to your telephone network.
  8. Turn on the power to your modem.
  9. Power on the switch.



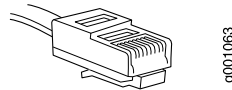
- Related Topics**
- Connecting an EX Series Switch to a Management Console on page 181
  - Console Port Connector Pinout Information for an EX Series Switch on page 58

## Connecting an EX Series Switch to a Network for Out-of-Band Management

You can monitor and manage an EX Series switch using a dedicated management channel. EX Series switches have a management port with an RJ-45 connector for out-of-band management. Use the management port to connect the EX Series switch to the management device.

Ensure that you have an Ethernet cable with an RJ-45 connector available. One such cable is provided with the switch. Figure 76 on page 187 shows the RJ-45 connector of the Ethernet cable supplied with the switch.

**Figure 76: Ethernet Cable Connector**



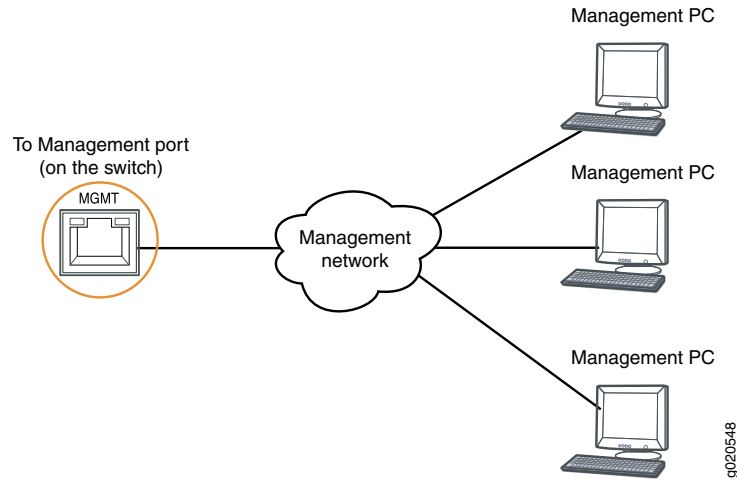
To connect an EX Series switch to a network for out-of-band management (see Figure 77 on page 188):

1. Connect one end of the Ethernet cable to the management port (labeled **MGMT**) on the EX Series switch.

For the location of the **MGMT** port on different EX Series switches:

- See Rear Panel of an EX2200 Switch.
  - See Rear Panel of an EX3200 Switch.
  - See Rear Panel of an EX4200 Switch.
  - See Front Panel of an EX4500 Switch.
  - See “Switch Fabric and Routing Engine (SRE) Module in an EX8208 Switch” on page 24.
  - See Routing Engine (RE) Module in an EX8216 Switch.
2. Connect the other end of the Ethernet cable to the management device.

Figure 77: Connecting an EX Series Switch to a Network for Out-of-Band Management



- Related Topics**
- Connecting an EX Series Switch to a Management Console on page 181
  - Management Port Connector Pinout Information for an EX2200 Switch
  - Management Port Connector Pinout Information for an EX3200 or EX4200 Switch
  - Management Port Connector Pinout Information for an EX4500 Switch
  - Management Port Connector Pinout Information for an EX8200 Switch on page 59
  - Cables Connecting the EX8200 Switch to Management Devices on page 105

# Performing Initial Configuration

- EX8200 Switch Default Configuration on page 189
- Connecting and Configuring an EX Series Switch (CLI Procedure) on page 190
- Connecting and Configuring an EX Series Switch (J-Web Procedure) on page 192

## EX8200 Switch Default Configuration

---

Each EX8200 switch is programmed with a factory default configuration that contains the values set for each configuration parameter when a switch is shipped. The default configuration file sets values for system parameters such as the ARP aging timer, the system log, and file messages, while also enabling the LLDP protocol, the RSTP protocol, IGMP snooping, and storm control.

When you commit changes to the configuration, a new configuration file is created that becomes the active configuration. You can always revert to the factory default configuration. See [Reverting to the Default Factory Configuration for the EX Series Switch](#).

This topic shows the factory default configuration file of an EX8200 switch:

```
system {
  arp {
    aging-timer 5
  }
}
syslog {
  user * {
    any emergency;
  }
  file messages {
    any notice;
    authorization info;
  }
  file interactive-commands {
    interactive-commands any;
  }
}
commit {
  factory-settings {
    reset-chassis-lcd-menu;
  }
}
```

```
}
protocols {
  igmp-snooping {
    vlan all;
  }
  lldp {
    interface all;
  }
  rstp;
}
ethernet-switching-options {
  storm-control {
    interface all;
  }
}
```

- Related Topics**
- Configuration Files Terms
  - Connecting and Configuring an EX Series Switch (CLI Procedure) on page 190
  - Connecting and Configuring an EX Series Switch (J-Web Procedure) on page 192
  - Understanding Configuration Files for EX Series Switches
  - EX8208 Switch Hardware Overview on page 3
  - EX8216 Switch Hardware Overview

## Connecting and Configuring an EX Series Switch (CLI Procedure)

---

There are two ways to connect and configure an EX Series switch: one method is through the console using the CLI and the other is using the J-Web interface. This topic describes the CLI procedure.



**NOTE:** To run the `ezsetup` script, the switch must have the factory default configuration as the active configuration. If you have configured anything on the switch and want to run `ezsetup`, revert to the factory default configuration. See [Reverting to the Default Factory Configuration for the EX Series Switch](#).

Before you begin connecting and configuring an EX Series switch through the console using the CLI:

- Set the following parameter values in the console server or PC:
  - Baud Rate—9600
  - Flow Control—None
  - Data—8
  - Parity—None

- Stop Bits—1
- DCD State—Disregard

To connect and configure the switch from the console:

1. Connect the console port to a laptop or PC using the RJ-45 to DB-9 serial port adapter. The RJ-45 cable and RJ-45 to DB-9 serial port adapter are supplied with the switch.
  - EX2200, EX3200, or EX4200 switch—The console port is located on the rear panel of the switch.
  - EX4500 switch—The console port is located on the front panel of the switch.
  - EX8200 switch—The console port is located on the Switch Fabric and Routing Engine (SRE) module in slot SRE0 in an EX8208 switch or on the Routing Engine (RE) module in slot RE0 in an EX8216 switch.
2. At the Junos OS shell prompt **root%**, type **ezsetup**.
3. Enter the hostname. This is optional.
4. Enter the root password you plan to use for this device. You are prompted to re-enter the root password.
5. Enter **yes** to enable services like Telnet and SSH. By default, Telnet is not enabled and SSH is enabled.



**NOTE:** When Telnet is enabled, you will not be able to log in to an EX Series switch through Telnet using root credentials. Root login is allowed only for SSH access.

6. Use the Management Options page to select the management scenario:



**NOTE:** On EX4500 and EX8200 switches, only the out-of-band management option is available.

- **Configure in-band management.** In this scenario you have the following two options:
    - Use the default VLAN.
    - Create a new VLAN—If you select this option, you are prompted to specify the VLAN name, VLAN ID, management IP address, and default gateway. Select the ports that must be part of this VLAN.
  - **Configure out-of-band management.** Specify the IP address and gateway of the management interface. Use this IP address to connect to the switch.
7. Specify the SNMP Read Community, Location, and Contact to configure SNMP parameters. These parameters are optional.
  8. Specify the system date and time. Select the time zone from the list. These options are optional.

The configured parameters are displayed. Enter **yes** to commit the configuration.

The configuration is committed as the active configuration for the switch. You can now log in with the CLI or the J-Web interface to continue configuring the switch. If you use the J-Web interface to continue configuring the switch, the Web session is redirected to the new management IP address. If the connection cannot be made, the J-Web interface displays instructions for starting a J-Web session.

- Related Topics**
- Connecting and Configuring an EX Series Switch (J-Web Procedure) on page 192
  - Installing and Connecting an EX2200 Switch
  - Installing and Connecting an EX3200 or EX4200 Switch
  - Installing and Connecting an EX4500 Switch
  - Installing and Connecting an EX8208 Switch on page 125
  - Installing and Connecting an EX8216 Switch

## Connecting and Configuring an EX Series Switch (J-Web Procedure)

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There are two ways to connect and configure an EX Series switch: one method is through the console using the CLI and the other is using the J-Web interface. This topic describes the J-Web procedure.



NOTE: Before you begin the configuration, enable a DHCP client on the management PC you will connect to the switch so that the switch can obtain an IP address dynamically.



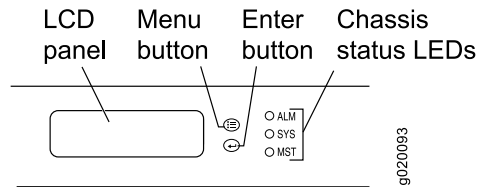
NOTE: Read the following steps before you begin the configuration. You must complete the initial configuration using EZSetup within 10 minutes. The switch exits EZSetup after 10 minutes and reverts to the factory default configuration, and the PC loses connectivity to the switch.

- EX2200 switch—The LEDs on the network ports on the front panel blink when the switch is in the initial setup mode.
- EX3200, EX4200, EX4500, or EX8200 switch—The LCD displays a count-down timer when the switch is in initial setup mode.

To connect and configure the switch using the J-Web interface:

1. Transition the switch into initial setup mode:
  - EX2200 switch—Press the mode button located on the lower right corner of the front panel for 10 seconds.
  - EX3200, EX4200, EX4500, or EX8200 switch—Use the **Menu** and **Enter** buttons located to the right of the LCD panel (see Figure 78 on page 193):

**Figure 78: LCD Panel in an EX3200, EX4200, EX4500, or EX8200 Switch**



1. Press the **Menu** button until you see **MAINTENANCE MENU**. Then press the **Enter** button.
  2. Press **Menu** until you see **ENTER EZSetup**. Then press **Enter**.
 

If EZSetup does not appear as an option in the menu, select Factory Default to return the switch to the factory default configuration. EZSetup is displayed in the menu only when the switch is set to the factory default configuration.
  3. Press **Enter** to confirm setup and continue with EZSetup.
2. Connect the Ethernet cable from the Ethernet port on the PC to the switch.
  - EX2200, EX3200, or EX4200 switch—Connect the cable to port 0 (**ge-0/0/0**) on the front panel of the switch.
  - EX4500 switch—Connect the cable to the port labeled **MGMT** on the front panel of the switch.
  - EX8200 switch—Connect the cable to the port labeled **MGMT** on the Switch Fabric and Routing Engine (SRE) module in slot SRE0 in an EX8208 switch or on the Routing Engine (RE) module in slot RE0 in an EX8216 switch.

These ports are configured as the DHCP server with the default IP address, **192.168.1.1**. The switch can assign an IP address to the management PC in the IP address range **192.168.1.2** through **192.168.1.253**.
3. From the PC, open a Web browser, type **http://192.168.1.1** in the address field, and press Enter.
4. On the J-Web login page, type **root** as the username, leave the password field blank, and click **Login**.
5. On the Introduction page, click **Next**.
6. On the Basic Settings page, modify the hostname, the root password, and date and time settings:

- Enter the hostname. This is optional.
- Enter a password and reenter the password.
- Specify the time zone.
- Synchronize the date and time settings of the switch with the management PC or set them manually by selecting the appropriate option button. This is optional.

Click **Next**.

7. Use the Management Options page to select the management scenario:



**NOTE:** On EX4500 and EX8200 switches, only the out-of-band management option is available.

- **In-band Management—Use VLAN 'default' for management.**

Select this option to configure all data interfaces as members of the default VLAN. Click **Next**. Specify the management IP address and the default gateway for the default VLAN.

- **In-band Management—Create new VLAN for management.**

Select this option to create a management VLAN. Click **Next**. Specify the VLAN name, VLAN ID, member interfaces, management IP address, and default gateway for the new VLAN.

- **Out-of-band Management—Configure management port.**

Select this option to configure only the management interface. Click **Next**. Specify the IP address and default gateway for the management interface.

8. Click **Next**.
9. On the Manage Access page, you may select options to enable Telnet, SSH, and SNMP services. For SNMP, you can configure the read community, location, and contact.
10. Click **Next**. The Summary screen displays the configured settings.
11. Click **Finish**.

The configuration is committed as the active switch configuration. You can now log in with the CLI or the J-Web interface to continue configuring the switch.

If you use the J-Web interface to continue configuring the switch, the Web session is redirected to the new management IP address. If the connection cannot be made, the J-Web interface displays instructions for starting a J-Web session.





NOTE: After the configuration is committed, the connectivity between the PC and the switch might be lost. To renew the connection, release and renew the IP address by executing the appropriate commands on the management PC or by removing and reinserting the Ethernet cable.

- Related Topics**
- Connecting and Configuring an EX Series Switch (CLI Procedure) on page 190
  - Installing and Connecting an EX2200 Switch
  - Installing and Connecting an EX3200 or EX4200 Switch
  - Installing and Connecting an EX4500 Switch
  - Installing and Connecting an EX8208 Switch on page 125
  - Installing and Connecting an EX8216 Switch



## PART 4

# Removing the Switch and Switch Components

- Removing the Switch on page 199
- Removing Switch Components on page 207



# Removing the Switch

- Powering Off an EX8200 Switch on page 199
- Removing an EX8208 Switch from a Rack or Cabinet on page 201
- Removing an EX8208 Switch from a Rack or Cabinet Using a Mechanical Lift on page 202
- Removing an EX8208 Switch from a Rack or Cabinet Without Using a Mechanical Lift on page 203

## Powering Off an EX8200 Switch

---

Before you power off the switch:

- Ensure that you understand how to prevent electrostatic discharge damage. See “Prevention of Electrostatic Discharge Damage on EX Series Switches” on page 292.
- Ensure that you do not need to forward traffic through the switch.

Ensure that you have the following parts and tools available to power off the switch:

- An electrostatic discharge (ESD) grounding strap
- An external management device such as a PC
- A cable to connect the external management device to the console port (CON) or management port (MGMT) on the master Switch Fabric and Routing Engine (SRE) module in an EX8208 switch or on the master Routing Engine (RE) module in an EX8216 switch.

To power off a switch:

1. Connect a management device to the master SRE module in an EX8208 switch or to the master RE module in an EX8216 switch. For connecting a management device to the console (CON) port, see “Connecting an EX Series Switch to a Management Console” on page 181. For connecting a management device to the management (MGMT) port, see “Connecting an EX Series Switch to a Network for Out-of-Band Management” on page 187.
2. If the switch has two SRE or RE modules, shut down the backup SRE or RE module first. (If your switch has only one SRE or RE module, skip to Step 2.) From the external management PC connected to the master SRE or RE module, issue the **request system halt other-routing-engine** operational mode CLI command.

This command shuts down the backup SRE or RE module gracefully. A message displays on the console confirming that the backup SRE/RE module has halted.

3. Shut down the master SRE or RE module from the external management device by issuing the **request system halt** operational mode CLI command. This command shuts down the switch gracefully and preserves system state information. A message displays on the console confirming that the operating system has halted.

You will see the following output (or something similar, depending on the hardware being shutdown) after entering the command:

```
Halting re1
*** FINAL System shutdown message from user@switch***
System going down IMMEDIATELY
Shutdown NOW!
[pid 859]
user@switch> JWaiting (max 60 seconds) for system process `vnlr' to stop...done
Waiting (max 60 seconds) for system process `bufdaemon' to stop...done
Waiting (max 60 seconds) for system process `syncer' to stop...
Syncing disks, vnodes remaining...2 2 2 1 1 0 0 0 done
syncing disks... All buffers synced.
Uptime: 3h3m49s
recorded reboot as normal shutdown
The operating system has halted. Please press any key to reboot.
```



**CAUTION:** The final output of any version of the **request system halt** command is the “The operating system has halted. Please press any key to reboot” message. Wait at least 60 seconds after first seeing this message before following the instructions in step 5 to power off the switch.

4. Attach the ESD grounding strap to your bare wrist and connect the strap to the ESD point on the chassis.
5. Flip the power supply **Enable** switch to the off position (OFF). Observe the power supply LEDs. The power supply LEDs should turn off (appear unlit). Repeat this step for all installed power supplies.



**NOTE:** After you power off a power supply, wait for at least 60 seconds before you turn it back on. After you power on a power supply, wait for at least 60 seconds before you turn it back off.

#### Related Topics

- Powering On an EX8200 Switch on page 180
- Connecting AC Power to an EX8200 Switch on page 173
- Connecting DC Power to an EX8200 Switch on page 175

## Removing an EX8208 Switch from a Rack or Cabinet

If you want to move an installed EX8208 switch to another location, you need to remove it from the rack or cabinet in which it is installed. In a four-post rack, an installed switch rests on adjustable mounting brackets bolted to the rack. In a two-post rack, an installed switch rests on the lip of the power cord tray installed in the rack. The front-mounting brackets (“ears”) attached to the chassis are also bolted to the rack.



**NOTE:** When you remove multiple switches from a rack or cabinet, remove the switch in the top of the rack or cabinet first and proceed to remove the rest of the switches from top to bottom.



**CAUTION:** At least three people must be available to lift an unloaded switch chassis (all components removed) out of a rack or cabinet. For instructions on removing a switch without using a mechanical lift, see “Removing an EX8208 Switch from a Rack or Cabinet Without Using a Mechanical Lift” on page 203.

Before removing an EX8208 switch from a rack or a cabinet:

- Ensure that the rack or cabinet is stable and secured to the building.
- Ensure that there is enough space to place the removed switch in its new location and along the path to the new location.
- Read “General Safety Guidelines and Warnings for EX Series Switches” on page 263, with particular attention to “Chassis Lifting Guidelines for EX8200 Switches” on page 276.
- Ensure that the switch has been safely powered off (see “Powering Off an EX8200 Switch” on page 199) and that you have unplugged (disconnected) the power cords.
- Ensure that you have disconnected any cables or wires attached to the switch ports.

Ensure that you have the following parts and tools available to remove the switch:

- A Phillips (+) screwdriver, number 2 or number 3, depending on the size of your rack mounting screws, for mounting the switch on a rack or cabinet.
- A Phillips (+) screwdriver, number 1, to remove the power supplies from the chassis if you are mounting the switch without using a mechanical lift

To remove an EX8200 switch from a rack or cabinet:

1. Use the appropriate Phillips (+) screwdriver to remove the mounting screws that attach the chassis front-mounting brackets to the rack or cabinet.
2. Place the removed screws in a labeled bag. You will need them when you reinstall the chassis.
3. Lift the chassis from the rack or cabinet and place it on a mechanical lift. For instructions on how to remove the chassis using a mechanical lift, see “Removing

an EX8208 Switch from a Rack or Cabinet Using a Mechanical Lift” on page 202. If a mechanical lift is not available, remove all components and manually lift the empty chassis out of the rack. For instructions on removing the chassis without using a mechanical lift, see “Removing an EX8208 Switch from a Rack or Cabinet Without Using a Mechanical Lift” on page 203.

- Related Topics**
- Removing an EX8208 Switch from a Rack or Cabinet Using a Mechanical Lift on page 202
  - Removing an EX8208 Switch from a Rack or Cabinet Without Using a Mechanical Lift on page 203

## Removing an EX8208 Switch from a Rack or Cabinet Using a Mechanical Lift

---

Because of the switch's size and weight, we strongly recommend using a mechanical lift to remove the switch. For instructions on removing a switch without using a mechanical lift, see “Removing an EX8208 Switch from a Rack or Cabinet Without Using a Mechanical Lift” on page 203.

Before you remove the switch using a lift:

- Ensure that the rack or cabinet is stable and secured to the building.
- Ensure that there is enough space to place the removed switch in its new location and along the path to the new location.
- Read “General Safety Guidelines and Warnings for EX Series Switches” on page 263, with particular attention to “Chassis Lifting Guidelines for EX8200 Switches” on page 276.
- Ensure that the switch has been safely powered off (see “Powering Off an EX8200 Switch” on page 199) and that you have unplugged (disconnected) the power cords to the power supplies.
- Ensure that you have disconnected any cables or wires attached to the switch ports.



**CAUTION:** When removing more than one switch from a rack or cabinet, remove the switch in the top of the rack or cabinet first and proceed to remove the rest of the switches from top to bottom.

---

Ensure that you have the following parts and tools available to remove the switch:

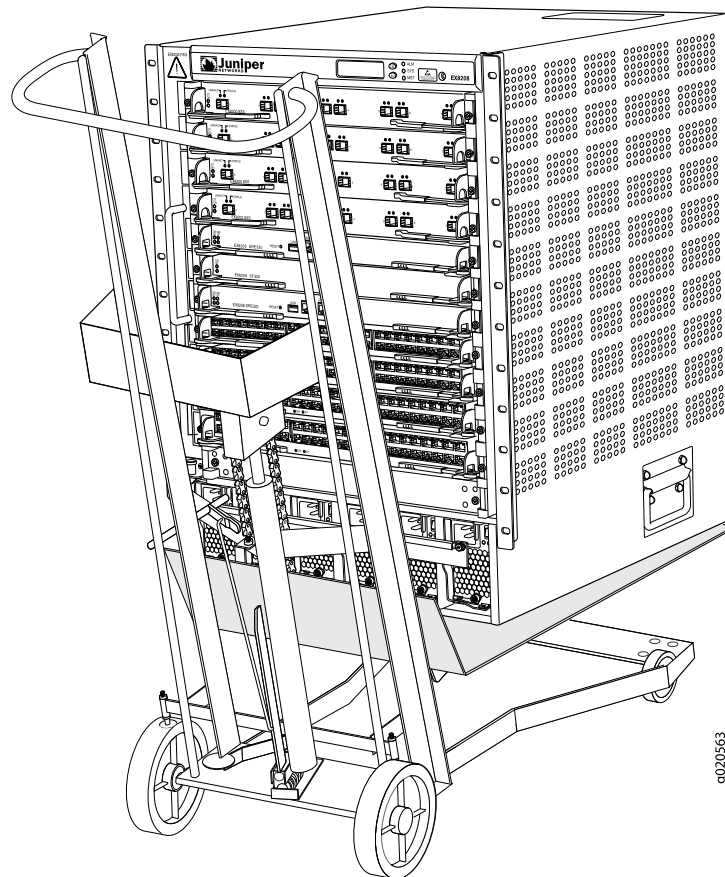
- A mechanical lift
- A Phillips (+) screwdriver, number 2 or number 3, depending on the size of your rack mounting screws



To remove the switch using a lift (see Figure 79 on page 203):

1. Use the appropriate Phillips (+) screwdriver to remove the 24 mounting screws that attach the chassis front-mounting brackets to the rack or cabinet.
2. Move the lift to the rack and position it so that its platform is centered about 0.5 in. (1.27 cm) below the bottom of the switch chassis and as close to it as possible.
3. Carefully slide the switch from the adjustable mounting brackets attached to the rack onto the lift.
4. Use the lift to transport the switch to its new location.

**Figure 79: Removing an EX8208 Switch Chassis Using a Mechanical Lift**



- Related Topics**
- Removing an EX8208 Switch from a Rack or Cabinet Without Using a Mechanical Lift on page 203

## Removing an EX8208 Switch from a Rack or Cabinet Without Using a Mechanical Lift

If you cannot use a mechanical lift to remove the switch (the preferred method), you can remove it manually.



CAUTION: The chassis with only the backplane and no other components weighs approximately 89 lb (41 kg). Lifting the chassis and removing it from a rack or cabinet requires at least three people.

The chassis has two handles. Do not lift a fully loaded chassis by the handles; make sure the chassis is empty before you lift it. If two of the people lifting the chassis use the handles to lift it, the third person must lift from the rear of the chassis. The rear of the chassis is heavier than the front of the chassis, so when you lift the chassis by the handles, the chassis tips toward the heavier back end. The person lifting from the back must be aware of this behavior and must be braced to prevent the chassis from tipping over.

When lifting the chassis, do not grasp the switch by the blue panel at the top front of the chassis. Doing so can cause the panel to pop off of the switch.



CAUTION: When removing more than one switch from a rack, remove the switch at the top first. We strongly recommend removing a switch that is in an upper position in a rack or cabinet with a lift.

Before you remove the switch:

- Ensure that the rack or cabinet is stable and secured to the building.
- Ensure that there is enough space to place the removed switch in its new location and along the path to the new location.
- Review chassis lifting guidelines as described in “Chassis Lifting Guidelines for EX8200 Switches” on page 276.
- Ensure that the switch has been safely powered off (see “Powering Off an EX8200 Switch” on page 199) and that you have unplugged (disconnected) the power cords to the power supplies.
- Ensure that you have disconnected any cables or wires attached to the switch ports.
- Remove all components except the backplane from the chassis. See:
  - Removing an SRE Module from an EX8208 Switch on page 215
  - Removing an SF Module from an EX8208 Switch on page 217
  - Removing a Line Card from an EX8200 Switch on page 218
  - Removing a Fan Tray from an EX8208 Switch on page 211
  - Removing an AC Power Supply from an EX8200 Switch on page 207

Ensure that you have the following parts and tools available to remove the switch:

- A Phillips (+) screwdriver, number 2 or number 3, depending on the size of your rack mounting screws

To remove the switch from the rack (see Figure 80 on page 205):

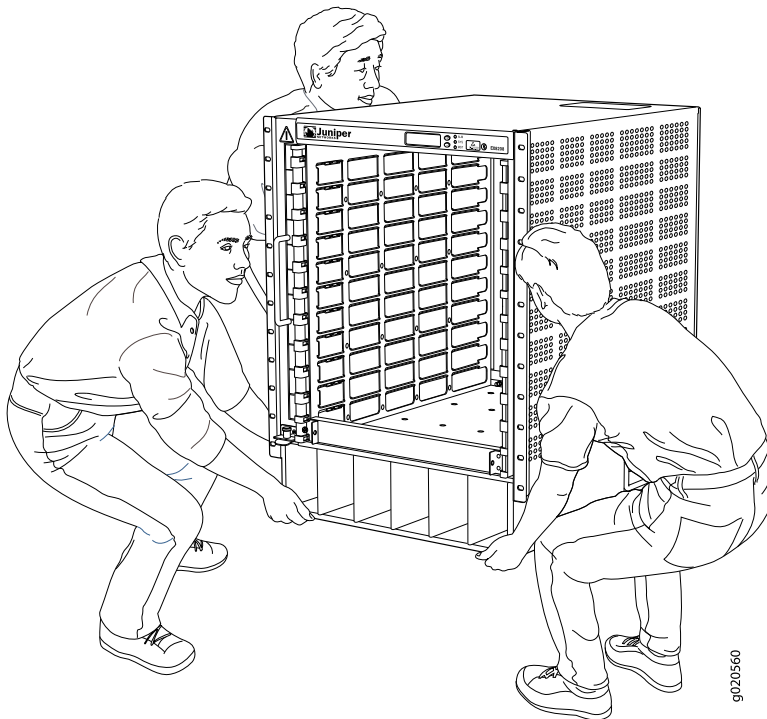
1. Use the appropriate Phillips (+) screwdriver to remove the 24 mounting screws that attach the chassis front-mounting brackets to the rack or cabinet.



**WARNING:** To prevent injury, keep your back straight and lift with your legs, not your back. Do not twist your body as you lift. Balance the load evenly and be sure that your footing is firm.

2. With one person on each side and one person in the back, hold onto the bottom of the chassis and carefully lift it out of the adjustable mounting brackets attached to the rack. If you have a pallet jack, move the switch onto the pallet jack.

**Figure 80: Removing an EX8208 Switch Chassis Without Using a Mechanical Lift**



3. Carefully move the chassis to its new location.

After you move the switch to its new location, reinstall the components in the chassis or store the components in antistatic bags. See:

- Installing an SRE Module in an EX8208 Switch on page 155
- Installing an SF Module in an EX8208 Switch on page 157

- Installing a Line Card in an EX8200 Switch on page 160
- Installing a Fan Tray in an EX8208 Switch on page 154
- Installing an AC Power Supply in an EX8200 Switch on page 150

**Related Topics** • Removing an EX8208 Switch from a Rack or Cabinet Using a Mechanical Lift on page 202

# Removing Switch Components

- Removing an AC Power Supply from an EX8200 Switch on page 207
- Removing a DC Power Supply from an EX8200 Switch on page 209
- Removing a Fan Tray from an EX8208 Switch on page 211
- Taking the SRE Module Offline in an EX8208 Switch on page 213
- Removing an SRE Module from an EX8208 Switch on page 215
- Taking the SF Module Offline in an EX8208 Switch on page 216
- Removing an SF Module from an EX8208 Switch on page 217
- Removing a Line Card from an EX8200 Switch on page 218
- Disconnecting a Fiber-Optic Cable from an EX Series Switch on page 221
- Removing a Transceiver from an EX Series Switch on page 222
- Removing the Power Cord Tray from a Rack or Cabinet for an EX8200 Switch on page 224

## Removing an AC Power Supply from an EX8200 Switch

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The AC power supply in an EX8200 switch is a hot-removable and hot-insertable field-replaceable unit (FRU). You remove AC power supplies from the front of the chassis.



**CAUTION:** Before you remove a power supply, ensure that you have power supplies sufficient to power the switch left in the chassis. See “Calculating Power Requirements for an EX8208 Switch” on page 114 or Calculating Power Requirements for an EX8216 Switch.

Before you remove an AC power supply from the switch:

- Ensure you understand how to prevent ESD damage. See “Prevention of Electrostatic Discharge Damage on EX Series Switches” on page 292.

Ensure that you have the following parts and tools available to remove an AC power supply from an EX8200 switch chassis:

- Electrostatic discharge (ESD) grounding strap
- Phillips (+) screwdriver, number 1

- Replacement power supply or a cover panel for the power supply slot

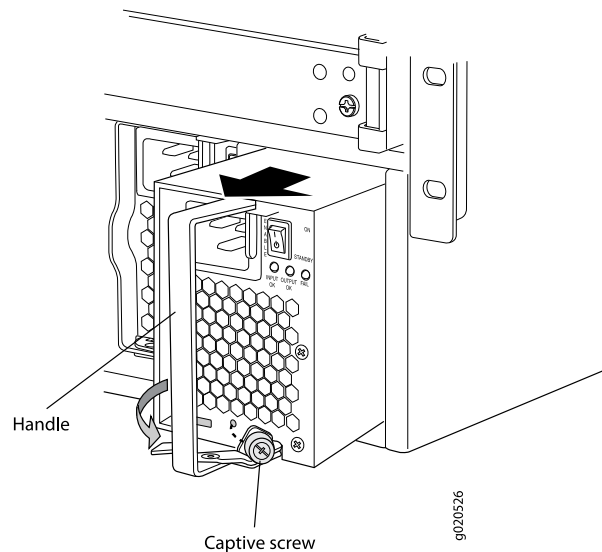


**CAUTION:** Do not leave the power supply slot empty for a long time while the switch is operational. Either replace the power supply promptly or install a cover panel over the empty slot.

To remove an AC power supply from an EX8200 switch (see Figure 81 on page 209):

1. Attach the electrostatic discharge (ESD) grounding strap to your bare wrist, and connect the strap to the ESD point on the chassis.
2. Flip the **Enable** switch next to the appliance inlet on the power supply to the Standby position.
3. Disconnect power from the switch by performing one of the two following tasks:
  - If the AC power source outlet has a power switch, set it to the OFF position.
  - If the AC power source outlet does not have a power switch, gently pull the male end of the power cord connected to the power source outlet out of the outlet.
4. Remove the power cord from the AC appliance inlet on the AC power supply faceplate.
5. Turn the adjustment nut of the power cord retainer counterclockwise till you can see the power cord. Pull the power cord from the slot in the adjustment nut.
6. Squeeze the two sides of the power cord retainer clip, and pull the L-shaped ends of the clip from the holes on each side of the AC appliance inlet to completely remove the power retainer clip.
7. Unscrew the captive screw counterclockwise using the Phillips (+) screwdriver, number 1.
8. Pull the captive screw away from the faceplate of the power supply to release the latch.
9. Pull the handle away from the faceplate of the power supply until it is perpendicular to the faceplate.
10. Taking care not to touch power supply components, pins, leads, or solder connections, place one hand under the power supply to support it. Grasp the power supply handle with your other hand and pull the power supply completely out of the chassis.
11. If you are not replacing the power supply, install the cover panel over the slot, using the Phillips (+) screwdriver to tighten the screw on the side of the cover panel.

Figure 81: Removing an AC Power Supply from an EX8200 Switch



- Related Topics**
- Installing an AC Power Supply in an EX8200 Switch on page 150
  - AC Power Supply in an EX8200 Switch on page 40

## Removing a DC Power Supply from an EX8200 Switch

The DC power supply in an EX8200 switch is a hot-removable and hot-insertable field-replaceable unit (FRU). You remove DC power supplies from the front of the chassis.



**NOTE:** EX8208 switches support 2000 W DC power supplies.  
EX8216 switches support 3000 W DC power supplies.



**CAUTION:** Before you remove a power supply, ensure that you have power supplies sufficient to power the switch left in the chassis. See “Calculating Power Requirements for an EX8208 Switch” on page 114 and Calculating Power Requirements for an EX8216 Switch.

Before you remove a DC power supply from the switch:

- Ensure that you understand how to prevent ESD damage. See “Prevention of Electrostatic Discharge Damage on EX Series Switches” on page 292.

Ensure that you have the following parts and tools available to remove a DC power supply from an EX8200 switch chassis:

- Electrostatic discharge (ESD) grounding strap
- Phillips (+) screwdriver, number 1

- Phillips (+) screwdriver, number 2
- 3/8 in. (9.5 mm) nut driver or socket wrench
- Replacement power supply or cover panel for the power supply slot

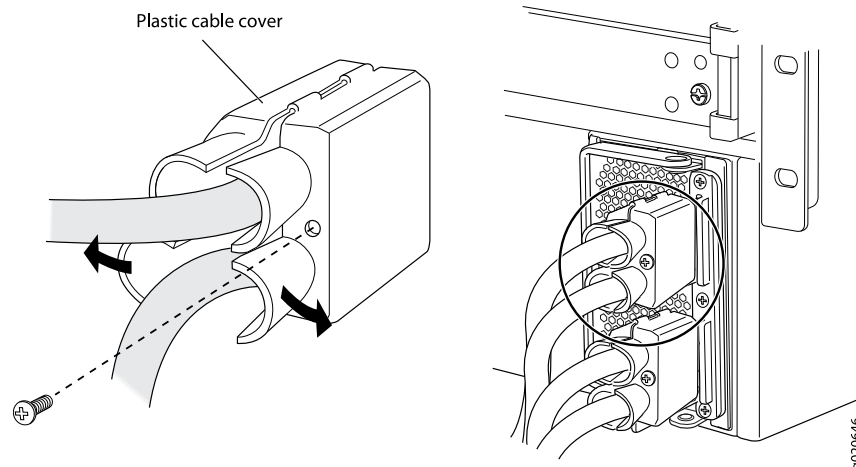


**CAUTION:** Do not leave the power supply slot empty for a long time while the switch is operational. Either replace the power supply unit promptly or install a cover panel over the empty slot.

To remove a DC power supply from an EX8200 switch (see Figure 83 on page 211):

1. Attach the electrostatic discharge (ESD) grounding strap to your bare wrist, and connect the strap to the ESD point on the chassis.
2. Make sure that the voltage across the DC power source cables leads is 0 V and that there is no chance that the cables might become active during the removal process.
3. Flip the **Enable** switch on the power supply to the Standby position.
4. Unscrew the screw counterclockwise using the Phillips (+) screwdriver, number 2, on each of the plastic cable covers that shield the input terminal studs.
5. Remove the plastic cable covers from both pairs of input terminal studs. See Figure 82 on page 210.

**Figure 82: Remove the Plastic Cable Cover**

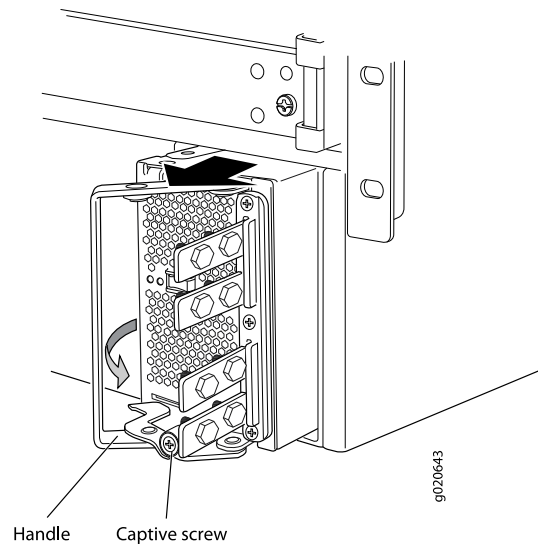


6. Unscrew the nuts counterclockwise using the 3/8 in. (9.5 mm) nut driver or socket wrench from the input terminal studs.
7. Remove the cable lugs and washers from the input terminal studs.
8. Unscrew the captive screw counterclockwise using the Phillips (+) screwdriver, number 1.
9. Pull the captive screw away from the faceplate of the power supply to release the latch.



10. Pull the handle away from the faceplate of the power supply until it is perpendicular to the faceplate.
11. Taking care not to touch power supply components, pins, leads, or solder connections, place one hand under the power supply to support it. Grasp the power supply handle with your other hand and pull the power supply completely out of the chassis.
12. If you are not replacing the power supply, install the cover panel over the slot, using the Phillips (+) screwdriver to tighten the screw on the side of the cover panel.

**Figure 83: Removing a DC Power Supply from an EX8200 Switch**



- Related Topics**
- Installing a DC Power Supply in an EX8200 Switch on page 152
  - DC Power Supply in an EX8200 Switch on page 48

## Removing a Fan Tray from an EX8208 Switch

An EX8208 switch has a single, field-replaceable fan tray. The fan tray is a hot-removable and hot-insertable field-replaceable unit (FRU); you can remove and replace the fan tray while the switch is running without turning off power to the switch or disrupting switching functions.



**CAUTION:** Do not remove the fan tray unless you have a replacement fan tray available.

The fan tray is installed vertically on the left side on the front of the chassis.

Before you remove a fan tray:

- Ensure you understand how to prevent ESD damage. See “Prevention of Electrostatic Discharge Damage on EX Series Switches” on page 292.

Ensure that you have the following parts and tools available to remove a fan tray from an EX8208 switch chassis:

- Electrostatic discharge (ESD) grounding strap
- Replacement fan tray



**CAUTION:** The fan tray can be removed and replaced while the switch is operating. However, the fan tray must be replaced within 2 minutes of removing the fan tray to prevent overheating of the chassis.

To remove a fan tray from an EX8208 switch chassis (see Figure 84 on page 213):

1. Attach the electrostatic discharge (ESD) grounding strap to your bare wrist, and connect the strap to the ESD point on the chassis.
2. Pull the spring-loaded latch, located at the base of the fan tray, upwards until the latch is completely free from the corresponding hole on the strike plate.
3. Hold the handle of the fan tray with one hand while holding the latch up with the other. Pull firmly on the handle to slide the fan tray about 5 in. (13 cm) out of the chassis.



**WARNING:** There is no fan guard on the fans. Be careful to keep your fingers clear of the moving fan blades when you are removing the fan tray. To avoid injury, do not touch the fans with your hands or any tools as you slide the fan tray out of the chassis—the fans might still be spinning.

4. Wait for approximately 15 seconds to allow all the fans to stop spinning.
5. Release the latch and use that hand to support the weight of the fan tray. Slide the fan tray completely out of the chassis.



1. Determine whether the SRE module is the master or backup using one of these methods:
  - Look at the **MS** (master) LED on the SRE module faceplate. If the **MS** LED is lit steady green, the SRE module is the master. If it is blinking green, the SRE module is the backup.
  - Issue the following CLI command:

```
user@switch> show chassis routing-engine
Routing Engine status:
Slot 0: Current state Master
Election priority Master (default) ...
```

2. If the SRE module that you want to remove is the master, make it the backup module:

```
user@switch> request chassis routing-engine master switch
```

3. From the master, halt the other Routing Engine:

```
user@switch> request system halt other-routing-engine
```

4. Wait a minute or two for the Routing Engine to halt before proceeding. If you are using a console connection, you will see a message when the system is halted. If the Routing Engine has not yet halted, the following step returns an error.

5. Take the SRE module offline:

```
user@switch> request chassis cb offline slot slot-number
```

where *slot-number* is either 0 (slot SRE0) or 1 (slot SRE1).

6. (Optional) Confirm that the SRE module is offline:

```
user@switch> show chassis environment cb
```

If the state field in the command output shows that the module is offline, then it is safe to remove the SRE module.

## Taking an SRE Module Offline in a Switch With One SRE Module

To take the SRE module offline:

1. Connect to the console port on the SRE module.
2. From the console, halt the SRE module:

```
user@switch> request system halt
```

The RE module is gracefully halted but not powered off.

When a message appears confirming that the operating system has halted, it is safe to remove the SRE module. The Routing Engine might take up to 5 minutes to gracefully halt.

- Related Topics**
- Installing an SRE Module in an EX8208 Switch on page 155
  - Removing an SRE Module from an EX8208 Switch on page 215
  - SRE Module LEDs in an EX8208 Switch on page 26

## Removing an SRE Module from an EX8208 Switch

You must remove the Switch Fabric and Routing Engine (SRE) module from the EX8208 switch chassis if you need to replace the module or if you need to remove switch components before moving the chassis without using a mechanical lift.



**CAUTION:** Do not lift the SRE module by holding the ejector levers. The levers cannot support the weight of the module. Lifting the module by the levers might bend the levers. Bent levers will prevent the SRE module from being properly seated in the chassis.

Before you begin to remove an SRE module:

- Ensure you understand how to prevent ESD damage. See “Prevention of Electrostatic Discharge Damage on EX Series Switches” on page 292.

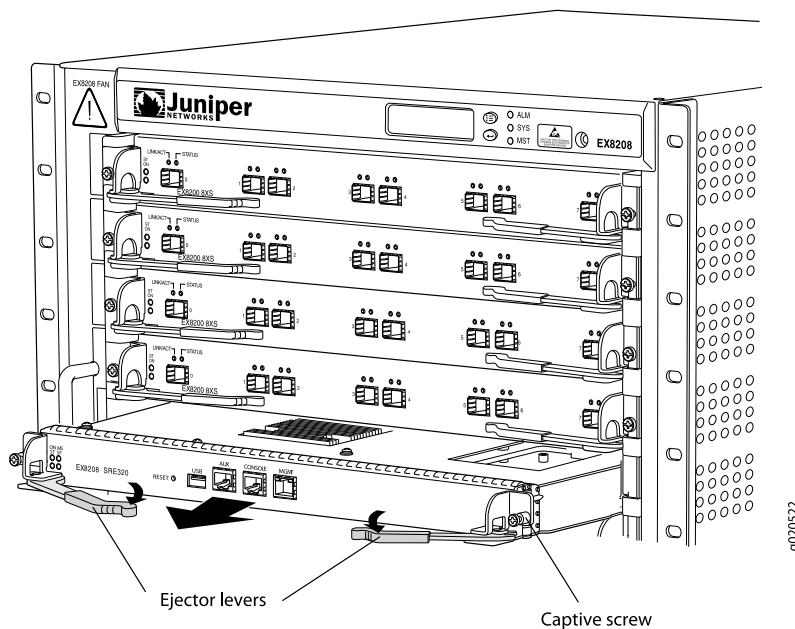
Ensure that you have the following parts and tools available to remove an SRE module:

- Electrostatic discharge (ESD) grounding strap
- Phillips (+) screwdriver, number 2
- Antistatic bag or antistatic mat
- Replacement SRE module or cover panel for the SRE module slot

To remove an SRE module from an EX8208 switch (see Figure 85 on page 216):

1. Take the SRE module offline. See “Taking the SRE Module Offline in an EX8208 Switch” on page 213.
2. Attach the antistatic discharge (ESD) grounding strap to your bare wrist and connect the strap to one of the ESD points on the chassis.
3. Place the antistatic bag or antistatic mat on a flat, stable surface.
4. Loosen the screws on each side of the SRE module by turning them counterclockwise using the screwdriver until they are completely unseated.
5. Pull both the ejector levers outwards, away from the faceplate of the SRE module, until they go no further. This action causes the SRE module to slide out of the chassis slightly.
6. Grasp the ejector levers and pull the SRE module out to about halfway.
7. Taking care not to touch the leads, pins, or solder connections, place one hand underneath the SRE module to support it and slide it completely out of the chassis.
8. Place the SRE module in the antistatic bag or on the antistatic mat.
9. If you are not replacing the SRE module, place the cover panel over the empty slot, insert the screws through the holes on each side of the cover panel, and tighten the screws with the screwdriver.

Figure 85: Removing an SRE Module from an EX8208 Switch



- Related Topics**
- Installing an SRE Module in an EX8208 Switch on page 155
  - Switch Fabric and Routing Engine (SRE) Module in an EX8208 Switch on page 24

## Taking the SF Module Offline in an EX8208 Switch

The SF module provides switching functionality for an EX8208 switch. Your switch can have either zero SF modules or one SF module.



**NOTE:** If you take the SF module offline in a switch configuration having only one Switch Fabric and Routing Engine (SRE) module, throughput will be low.

To take the SF module offline:

1. Take the SF module offline:

```
user@switch> request chassis cb offline slot 2
```

For an SF module, the control board slot number is always 2.

2. (Optional) Confirm that the SF module is offline:

```
user@switch> show chassis environment cb slot-number
```

The state field in the command output shows that the SF module is offline. It is now safe to remove or replace the SF module.

- Related Topics**
- Installing an SF Module in an EX8208 Switch on page 157

- Removing an SF Module from an EX8208 Switch on page 217
- Switch Fabric (SF) Module in an EX8208 Switch on page 28

## Removing an SF Module from an EX8208 Switch

You must remove the Switch Fabric (SF) module from the EX8208 switch if you need to replace the module or if you need to remove the switch components before moving the chassis without using a mechanical lift.

The SF module is always installed in the slot labeled SF.



**NOTE:** Do not lift the SF module by holding the ejector levers. The levers cannot support the weight of the module. Lifting the modules by the levers might bend the levers. Bent levers will prevent the SF module from being properly seated in the chassis.

Before you begin to remove an SF module:

- Ensure you understand how to prevent ESD damage. See “Prevention of Electrostatic Discharge Damage on EX Series Switches” on page 292.

Ensure that you have the following parts and tools available to remove an SF module:

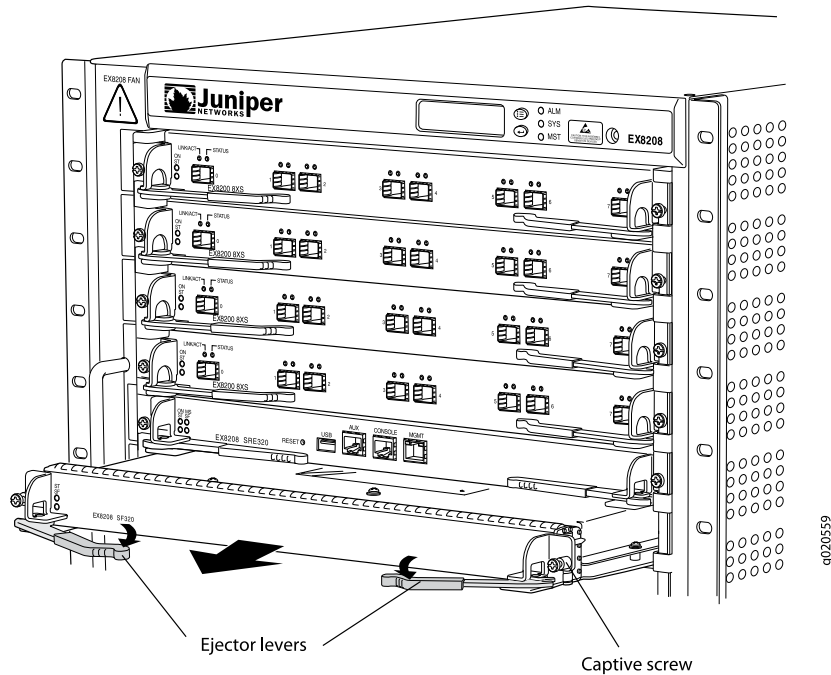
- Electrostatic discharge (ESD) grounding strap
- Phillips (+) screwdriver, number 2
- Antistatic bag or antistatic mat
- Replacement SF module or cover panel for the slot

To remove an SF module (see Figure 86 on page 218):

1. Take the SF module offline. See “Taking the SF Module Offline in an EX8208 Switch” on page 216.
2. Attach the electrostatic discharge (ESD) grounding strap to your bare wrist and connect the strap to the ESD point on the chassis.
3. Place the antistatic bag or antistatic mat on a flat, stable surface.
4. Loosen the screws on each side of the SF module by turning them counterclockwise using the screwdriver until they are completely unseated.
5. Pull both the ejector levers outwards, away from the faceplate of the SF module, until they go no further. This action causes the SF module to slide out of the chassis slightly.
6. Grasping the ejector levers, pull the SF module to about halfway out.
7. Taking care not to touch the leads, pins, or solder connections, place one hand underneath the SF module to support it and slide it out of the chassis completely.

8. Place the SF module in the antistatic bag or on the antistatic mat.
9. If you are not replacing the SF module, install the cover panel over the empty slot by tightening the screws on each side of the cover panel with the screwdriver.

Figure 86: Removing an SF Module from an EX8208 Switch



- Related Topics**
- Installing an SF Module in an EX8208 Switch on page 157
  - Switch Fabric (SF) Module in an EX8208 Switch on page 28

## Removing a Line Card from an EX8200 Switch

EX8200 switches have field-replaceable unit (FRU) line cards that can be installed in the line card slots on the front of the switch chassis. The line cards are hot-insertable and hot-removable: You can remove and replace them without powering off the switch or disrupting switch functions.

Before you begin removing a line card from an EX8200 switch:

- Ensure that you have taken the necessary precautions to prevent Electrostatic discharge (ESD) damage (see “Prevention of Electrostatic Discharge Damage on EX Series Switches” on page 292).
- If there are any transceivers installed in the line card, remove them before you remove the line card. See “Removing a Transceiver from an EX Series Switch” on page 222.
- Ensure that you know how to handle and store the line card (see “Handling and Storing Line Cards in EX8200 Switches” on page 227).



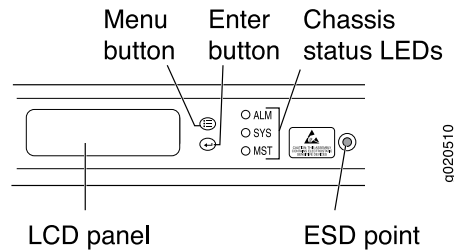
Ensure that you have the following parts and tools available to remove a line card from an EX8200 switch chassis:

- ESD grounding strap
- Phillips (+) screwdriver, number 2
- An antistatic bag or an antistatic mat
- Replacement line card or a cover panel and its captive screws to cover the empty slot

To remove a line card from an EX8200 switch:

1. Place the antistatic bag or antistatic mat on a flat, stable surface.
2. Attach the ESD grounding strap to your bare wrist and connect the strap to the ESD point on the switch chassis (see Figure 87 on page 219). The ESD point is at the same location on EX8208 and EX8216 switches.

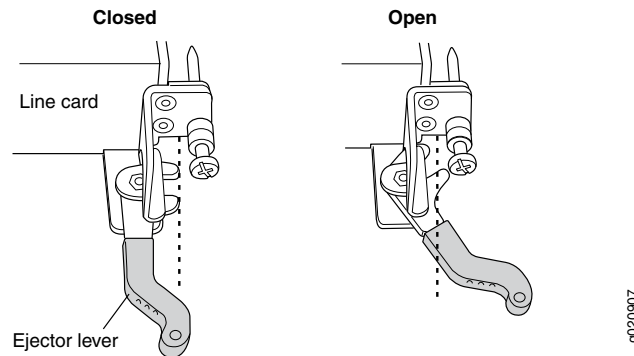
**Figure 87: Location of the ESD Point on an EX8200 Switch Chassis**



3. Label the cables connected to each port on the line card so you can reconnect the cables to the correct ports.
4. Take the line card offline by issuing the following CLI command:
 

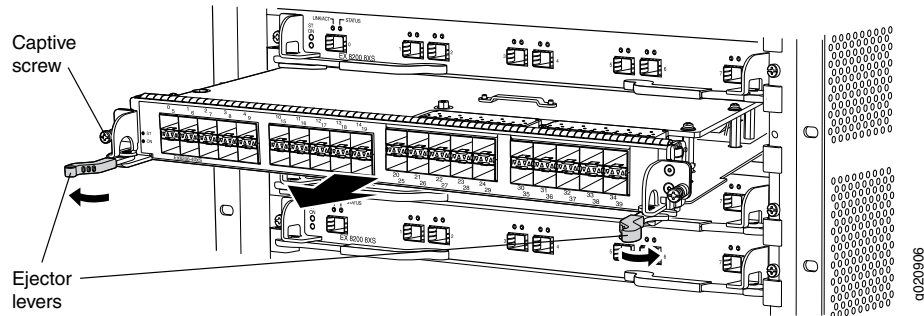
```
user@switch> request chassis fpc slot slot-number offline
```
5. Remove the captive screws on the faceplate of the line card by using the screwdriver.
6. Grasp the ejector levers on the faceplate of the line card and pull them outward simultaneously until they are in the open position and the line card is fully unseated. The closed and the open positions of the shorter ejector levers are not as markedly distinguishable as those of the longer ones (see Figure 88 on page 219).

**Figure 88: Closed and Open Positions of the 2-in. Ejector Lever**

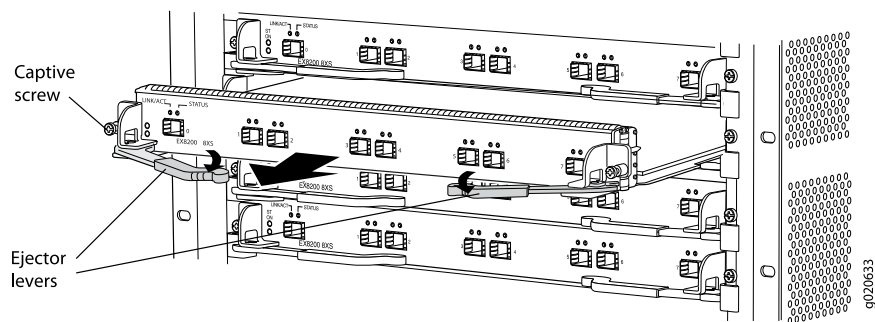


7. Grasp the ejector levers and gently slide the line card halfway out of the chassis (see Figure 89 on page 220 and Figure 90 on page 220).

**Figure 89: Removing a Line Card with a 2-in. Ejector Lever**



**Figure 90: Removing a Line Card with a 4-in. Ejector Lever**



See “Handling and Storing Line Cards in EX8200 Switches” on page 227.



**CAUTION:** Do not lift the line card by holding the ejector levers on the faceplate or the edge connectors. The levers cannot support the weight of the line card. Lifting the line cards by the levers might bend them. Bent levers prevent the line cards from being properly seated in the chassis.



**CAUTION:** Do not stack line cards on top of one another or on top of any other component. Place each line card separately in the antistatic bag or on the antistatic mat placed on a flat, stable surface.



**CAUTION:** The line cards in EX8200 switches weigh more than 10 lb (4.5 kg). Be prepared to support the full weight as you slide the line card out of the chassis.

8. Place one hand around the faceplate of the line card and the other hand under the line card to support it. Taking care not to touch line card components, pins, leads, or solder connections, gently slide the line card completely out of the chassis and place it in an antistatic bag or on its own antistatic mat placed on a flat, stable surface.



**CAUTION:** After removing a line card, wait for at least 30 seconds before installing a line card or removing another line card.

9. If you are not installing a line card in the emptied line card slot within a short time, install a blank cover panel over the slot and secure it with captive screws by using the screwdriver. Do this to protect the interior of the chassis from dust or other foreign substances and to ensure that the airflow inside the chassis is not disrupted.

#### Related Topics

- Installing a Line Card in an EX8200 Switch on page 160
- 8-port SFP+ Line Card in an EX8200 Switch on page 30
- 40-port SFP+ Line Card in an EX8200 Switch on page 31
- 48-port SFP Line Card in an EX8200 Switch on page 33
- 48-port RJ-45 Line Card in an EX8200 Switch on page 34

## Disconnecting a Fiber-Optic Cable from an EX Series Switch

EX Series switches have field-replaceable unit (FRU) optical transceivers to which you can connect fiber-optic cables.

Before you begin disconnecting a fiber-optic cable from an optical transceiver installed in an EX Series switch, ensure that you have taken the necessary precautions for safe handling of lasers (see “Laser and LED Safety Guidelines and Warnings for EX Series Switches” on page 269).

Ensure that you have the following parts and tools available:

- A rubber safety cap to cover the transceiver
- A rubber safety cap to cover the fiber-optic cable connector

To disconnect a fiber-optic cable from an optical transceiver installed in the switch:

1. Disable the port in which the transceiver is installed by issuing the command:

```
[edit interfaces]
```

```
user@switch# set interface-name disable
```



**WARNING:** Do not look directly into a fiber-optic transceiver or into the ends of fiber-optic cables. Fiber-optic transceivers and fiber-optic cables connected to transceivers emit laser light that can damage your eyes.

2. Carefully unplug the fiber-optic cable connector from the transceiver.
3. Cover the transceiver with a rubber safety cap.



**WARNING:** Do not leave a fiber-optic transceiver uncovered except when inserting or removing a cable. The rubber safety cap keeps the port clean and prevents accidental exposure to laser light.

4. Cover the fiber-optic cable connector with the rubber safety cap.

**Related Topics**

- Connecting a Fiber-Optic Cable to an EX Series Switch on page 165
- Removing a Transceiver from an EX Series Switch on page 222
- Maintaining Fiber-Optic Cables in EX Series Switches on page 231
- Optical Interface Support in EX2200 Switches
- Optical Interface Support in EX3200 and EX4200 Switches
- Optical Interface Support in EX4500 Switches
- Optical Interface Support in EX8200 Switches on page 60

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## Removing a Transceiver from an EX Series Switch

---

The transceivers for EX Series switches are hot-removable and hot-insertable field-replaceable units (FRUs): You can remove and replace them without powering off the switch or disrupting switch functions.

Before you begin removing a transceiver from an EX Series switch, ensure that you have taken the necessary precautions for safe handling of lasers (see “Laser and LED Safety Guidelines and Warnings for EX Series Switches” on page 269).

Ensure that you have the following parts and tools available:

- An antistatic bag or an antistatic mat
- Needlenose pliers
- Rubber safety caps to cover the transceiver and fiber-optic cable connector
- A dust cover to cover the port

Figure 91 on page 223 shows how to remove an SFP transceiver. The procedure is the same for all transceiver types.

To remove a transceiver from an EX Series switch:

1. Place the antistatic bag or antistatic mat on a flat, stable surface.
2. Label the cable connected to the transceiver so that you can reconnect it correctly.



**WARNING:** Do not look directly into a fiber-optic transceiver or into the ends of fiber-optic cables. Fiber-optic transceivers and fiber-optic cables connected to transceivers emit laser light that can damage your eyes.



**WARNING:** Do not leave a fiber-optic transceiver uncovered except when inserting or removing a cable. The rubber safety cap keeps the port clean and prevents accidental exposure to laser light.



**CAUTION:** Do not bend fiber-optic cables beyond their minimum bend radius. An arc smaller than a few inches in diameter can damage the cables and cause problems that are difficult to diagnose.

3. Remove the cable connected to the transceiver (see “Disconnecting a Fiber-Optic Cable from an EX Series Switch” on page 221). Cover the transceiver and the end of each fiber-optic cable connector with a rubber safety cap immediately after disconnecting the fiber-optic cables.
4. Using your fingers, pull the ejector lever on the transceiver to unlock the transceiver.



**CAUTION:** Before removing the transceiver, make sure you open the ejector lever completely until you hear it click. This prevents damage to the transceiver.

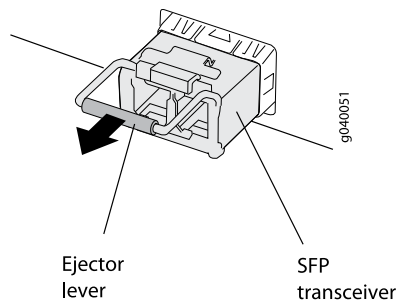
5. Using the needlenose pliers, pull the ejector lever out from the transceiver.
6. Grasp the transceiver ejector lever and gently slide the transceiver approximately 0.5 in. (1.3 cm) straight out of the port.



**CAUTION:** To avoid electrostatic discharge (ESD) damage to the transceiver, do not touch the connector pins at the end of the transceiver.

7. Using your fingers, grasp the body of the transceiver and pull it straight out of the port.
8. Place the transceiver in the antistatic bag or on the antistatic mat placed on a flat, stable surface.
9. Place the dust cover over the empty port.

**Figure 91: Removing a Transceiver from an EX Series Switch**



**Related Topics** • Installing a Transceiver in an EX Series Switch on page 163

- Optical Interface Support in EX2200 Switches
- Optical Interface Support in EX3200 and EX4200 Switches
- Optical Interface Support in EX4500 Switches
- Optical Interface Support in EX8200 Switches on page 60

## Removing the Power Cord Tray from a Rack or Cabinet for an EX8200 Switch

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You can remove the power cord tray from a rack or cabinet. (The remainder of this topic uses “rack” to mean “rack or cabinet.”)

In two-post rack installations, we recommend that you do not remove the power cord tray unless you are also removing the switch and that you remove the switch before you remove the power cord tray.



**NOTE:** The EX8216 switch can be installed only in a four-post rack. Installation in a two-post rack is not supported.

If you remove the power cord tray before removing the EX8208 switch from a two-post rack, there is no support for the underside of the switch. This creates a problem if and when you need to remove the switch, because the chassis has no support once you remove the screws that hold the front-mounting brackets to the rack. In a four-post rack this is not an issue because the switch rests on the adjustable mounting brackets.

Before you begin to remove the power cord tray:

- Ensure no power cables are resting on or threaded through the power cord tray.
- Remove the switch if the switch and power cord tray are installed on a two-post rack. See “Removing an EX8208 Switch from a Rack or Cabinet” on page 201.

Ensure that you have the following parts and tools available to remove the power cord tray:

- A Phillips (+) screwdriver, number 1, 2, or 3, depending on the size of your rack mounting screws

To remove the power cord tray:

1. Use the appropriate Phillips (+) screwdriver to remove the four mounting screws that hold the power cord tray in the rack.
2. Remove the power cord tray and store it in the original switch accessory box for later use.

**Related Topics** • Installing the Power Cord Tray in a Rack or Cabinet for an EX8200 Switch on page 135

PART 5

# Switch and Component Maintenance

- Routine Maintenance on page 227





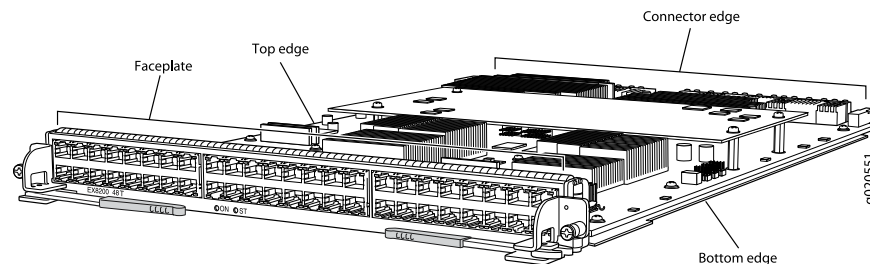
# Routine Maintenance

- Handling and Storing Line Cards in EX8200 Switches on page 227
- Maintaining Line Card Cables in EX8200 Switches on page 231
- Maintaining Fiber-Optic Cables in EX Series Switches on page 231
- Removing a Battery from an EX8208 Switch for Recycling on page 233

## Handling and Storing Line Cards in EX8200 Switches

Components in the line cards are fragile. To avoid damaging the line cards, follow the procedures in this topic. The procedures use the following terms to describe the four edges of the line cards (see Figure 92 on page 227):

**Figure 92: Edges of the Line Cards in an EX8200 Switch**



- Faceplate—Edge of the line card that has connectors into which you insert the transceivers or RJ-45 cables.
- Connector edge—Edge opposite the faceplate.
- Top edge—Edge at the top of the line card when the line card is vertical.
- Bottom edge—Edge at the bottom of the line card when the line card is vertical.



**CAUTION:** Failure to handle line cards as specified in these procedures can cause irreparable damage to them.

This topic describes the following tasks:

- Holding a Line Card on page 228
- Storing a Line Card on page 230

## Holding a Line Card

You must hold a line card horizontally when installing it in the chassis. You may hold a line card vertically or horizontally when carrying it.



**CAUTION:** The line cards in EX8200 switches weigh more than 10 lb (4.5 kg). Be prepared to support the full weight as you slide the line card into the chassis.

To hold a line card vertically:

1. Orient the line card so that the faceplate faces you. To verify the orientation, confirm that the text on the line card is right-side up.
2. Place one hand around the line card faceplate about a quarter of the way down from the top edge. Do not press hard on it.
3. Place the other hand at the bottom edge of the line card.

If the line card is horizontal before you grasp it, place your left hand around the faceplate and your right hand along the bottom edge.

To hold a line card horizontally:

1. Orient the line card so that the faceplate faces you.
2. Grasp the top edge with your left hand and the bottom edge with your right hand.

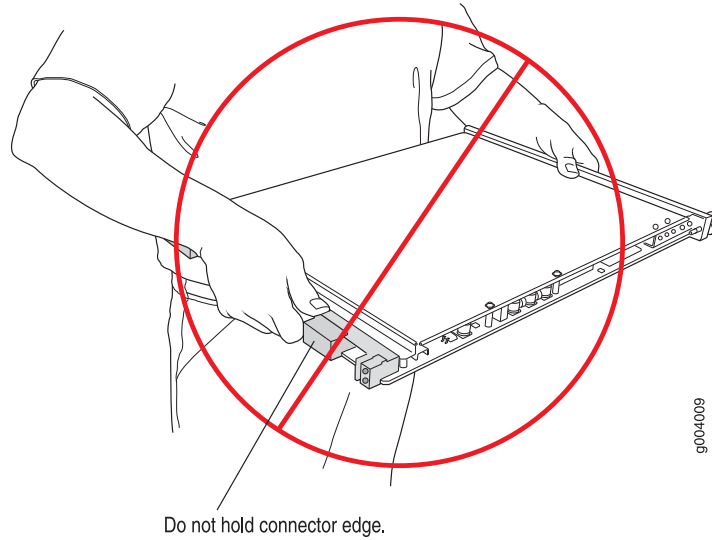
You can rest the faceplate of the line card against your body as you carry it.



**CAUTION:** Take care not to hit the line card against any object as you carry it. Line card components are fragile.

Never hold or grasp the line card anywhere except the places mentioned in these procedures. In particular, never grasp the connector edge (see Figure 93 on page 229).

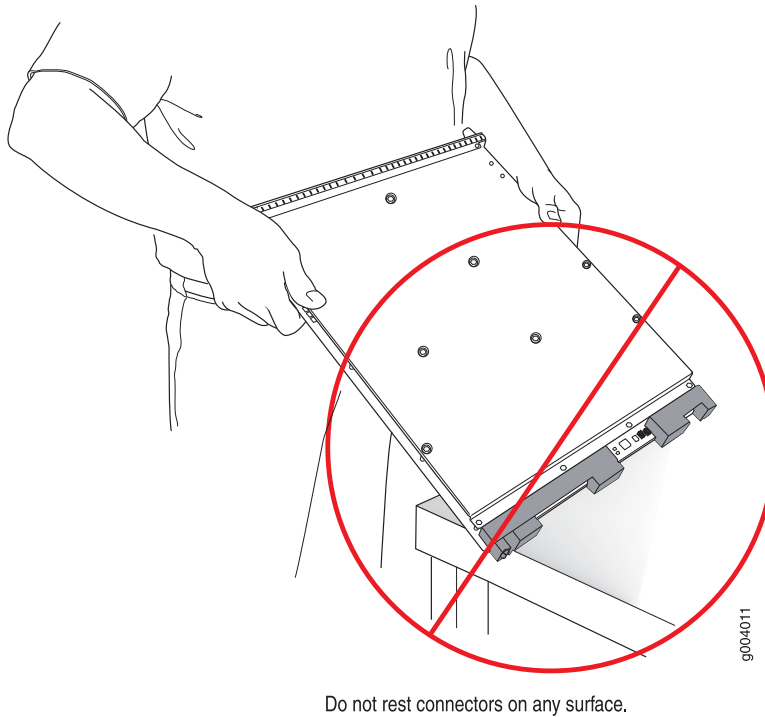
**Figure 93: Do Not Grasp the Connector Edge**



Never carry the line card while holding the faceplate with only one hand.

Do not rest any edge of a line card directly against a hard surface (see Figure 94 on page 229).

**Figure 94: Do Not Rest the Edge of a Line Card on a Hard Surface**



If you must rest a line card temporarily on an edge, place a cushion between the edge and the surface.

Do not stack line cards on top of one another or on top of any other component. Place each line card separately in an antistatic bag or on an antistatic mat placed on a flat, stable surface.

---

## Storing a Line Card

You must store a line card in the chassis or in a spare shipping container, horizontally and sheet metal side down. Do not stack line cards on top of one another or on top of any other component. Place each line card separately in an antistatic bag or on an antistatic mat placed on a flat, stable surface.



---

**NOTE:** Because the line card is heavy, and because antistatic bags are fragile, inserting the line card into the bag is best done with two people, each to do one of the following steps.

---

To insert a line card into an antistatic bag:

1. Hold the line card in the horizontal position with the faceplate facing you.
2. Slide the opening of the bag over the line card connector edge.

If you must insert the line card into a bag by yourself:

1. Lay the line card horizontally on a flat, stable surface, sheet metal side down.
2. Orient the line card with the faceplate facing you.
3. Carefully insert the line card connector edge into the opening of the bag and pull the bag toward you to cover the line card.

### Related Topics

- Maintaining Line Card Cables in EX8200 Switches on page 231
- Installing a Line Card in an EX8200 Switch on page 160
- Removing a Line Card from an EX8200 Switch on page 218
- General Safety Guidelines and Warnings for EX Series Switches on page 263
- 8-port SFP+ Line Card in an EX8200 Switch on page 30
- 40-port SFP+ Line Card in an EX8200 Switch on page 31
- 48-port SFP Line Card in an EX8200 Switch on page 33
- 48-port RJ-45 Line Card in an EX8200 Switch on page 34

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## Maintaining Line Card Cables in EX8200 Switches

---

Components in the line cards are fragile. To extend the lives of your line card cables and to avoid problems that can result from cable damage, follow these procedures:

To maintain line card cables in EX8200 switches:

- Place excess cable out of the way. Do not allow fastened loops of cable to dangle from the connector. Placing fasteners on the loops helps retain their shape.
- Keep the cable connections clean and free of dust and other particles, which can cause drops in the received power level. Always inspect cables and clean them if necessary before connecting an interface.
- Label both ends of line card cables to identify them.

- Related Topics**
- Handling and Storing Line Cards in EX8200 Switches on page 227
  - Maintaining Fiber-Optic Cables in EX Series Switches on page 231
  - 8-port SFP+ Line Card in an EX8200 Switch on page 30
  - 40-port SFP+ Line Card in an EX8200 Switch on page 31
  - 48-port SFP Line Card in an EX8200 Switch on page 33
  - 48-port RJ-45 Line Card in an EX8200 Switch on page 34

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## Maintaining Fiber-Optic Cables in EX Series Switches

---

Fiber-optic cables connect to optical transceivers that are installed in EX Series switches.

To maintain fiber-optic cables:

- When you unplug a fiber-optic cable from a transceiver, place rubber safety caps over the transceiver and on the end of the cable.
- Anchor fiber-optic cables to avoid stress on the connectors. When attaching a fiber-optic cable to a transceiver, be sure to secure the fiber-optic cable so that it is not supporting its own weight as it hangs to the floor. Never let a fiber-optic cable hang free from the connector.
- Avoid bending fiber-optic cables beyond their minimum bend radius. Bending fiber-optic cables into arcs smaller than a few inches in diameter can damage the cables and cause problems that are difficult to diagnose.
- Frequent plugging and unplugging of fiber-optic cables in and out of optical instruments can damage the instruments, which are expensive to repair. Attach a short fiber extension to the optical equipment. Any wear and tear due to frequent plugging and

unplugging is then absorbed by the short fiber extension, which is easier and less expensive to replace than the instruments.

- Keep fiber-optic cable connections clean. Micro-deposits of oil and dust in the canal of the transceiver or cable connector can cause loss of light, reduction in signal power, and possibly intermittent problems with the optical connection.

To clean the transceiver canal, use an appropriate fiber-cleaning device such as RIFOCS Fiber Optic Adaptor Cleaning Wands (part number 946). Follow the directions in the cleaning kit you use.

After cleaning the transceiver, make sure that the connector tip of the fiber-optic cable is clean. Use only an approved alcohol-free fiber-optic cable cleaning kit such as the Opptex Cletop-S<sup>®</sup> Fiber Cleaner. Follow the directions in the cleaning kit you use.

**Related Topics**

- Handling and Storing Line Cards in EX8200 Switches on page 227
- Maintaining Line Card Cables in EX8200 Switches on page 231
- Connecting a Fiber-Optic Cable to an EX Series Switch on page 165
- Laser and LED Safety Guidelines and Warnings for EX Series Switches on page 269
- Optical Interface Support in EX2200 Switches
- Optical Interface Support in EX3200 and EX4200 Switches
- Optical Interface Support in EX4500 Switches
- Optical Interface Support in EX8200 Switches on page 60

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## Removing a Battery from an EX8208 Switch for Recycling

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The EX8208 switch contains a CR2032 2.7-volt lithium battery on each Switch Fabric and Routing Engine (SRE) module installed in the chassis. The coin-shaped battery is approximately 0.75in. (20 mm) in diameter. The battery is estimated to last for over 50 years.

A base configuration switch has one SRE module, and a redundant configuration switch has two modules installed. Before recycling an SRE module or the switch chassis, remove the battery from each SRE module for battery recycling.

Before you begin to remove the battery:

- Power off the switch or take the SRE module offline. If only one SRE module is installed in a powered-on switch, you must halt the module before removing it. See “Taking the SRE Module Offline in an EX8208 Switch” on page 213.

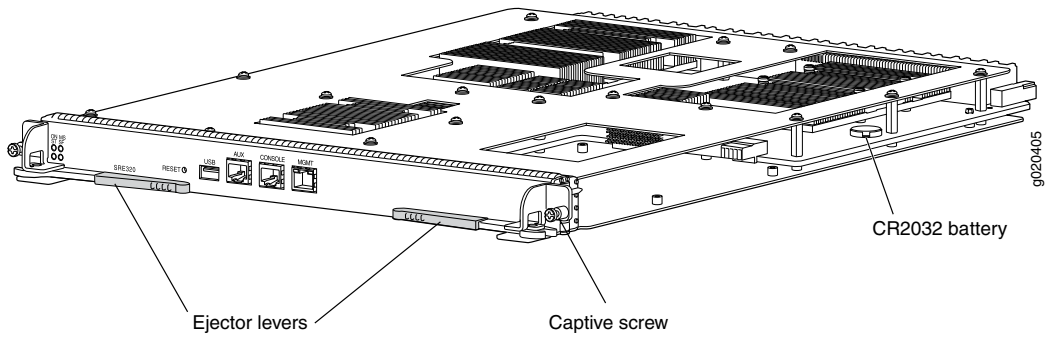
Ensure that you have the following parts and tools available:

- Phillips (+) screwdriver, number 2
- Electrostatic discharge (ESD) grounding strap

To remove the battery from an SRE module in the switch (see Figure 95 on page 234):

1. Attach the antistatic discharge (ESD) grounding strap to your bare wrist, and connect the strap to one of the ESD points on the chassis.
2. Locate the SRE module in the switch chassis.
3. With the screwdriver, loosen the captive screws on each side of the SRE module by turning them counterclockwise until they are completely unseated.
4. Pull both ejector levers outwards, away from the faceplate of the SRE module, until they go no further. This action causes the module to slide slightly out of the chassis.
5. Grasp the ejector levers, and pull the SRE module out to about halfway.
6. Place one hand underneath the module to support it, and slide it completely out of the chassis.
7. Locate the coin-shaped CR2032 battery on the right side of the module near the third post (see Figure 95 on page 234).
8. With your finger, pry the battery out of its socket.
9. If you are recycling the entire chassis of a redundant configuration, repeat Steps 2 through 8 for the second SRE module.
10. Recycle the battery or batteries as required.

Figure 95: Location of the CR2032 Battery in an SRE Module



**Related Topics** • Taking the SRE Module Offline in an EX8208 Switch on page 213



PART 6

# Troubleshooting Switch Components

- [Troubleshooting Switch Components on page 237](#)



# Troubleshooting Switch Components

- Troubleshooting Line Card Installation on EX8200 Switches on page 237

## Troubleshooting Line Card Installation on EX8200 Switches

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**Problem** The **ON** LED on a line card does not blink in green or is not lit steadily after the line card is installed in an EX8200 switch.

**Cause** One or both of these has caused these problems:

- The switch does not have sufficient power to power the line card while maintaining its N+1 or N+N power configuration.
- The line card is not seated correctly in the slot in the switch chassis.

**Solution** 1. If the **ON** LED does not blink in green:

- Ensure the switch has sufficient power to power the line card while maintaining its N+1 or N+N power configuration:
  - To determine the power requirements of the line card, see “Power Requirements for EX8208 Switch Components” on page 111 or Power Requirements for EX8216 Switch Components.
  - To determine whether the switch has enough power available for the line card, use the **show chassis power-budget-statistics** command if your switch is running Junos OS Release 10.2 or later. If your switch is running Junos OS Release 10.1 or earlier, see “Calculating Power Requirements for an EX8208 Switch” on page 114 or Calculating Power Requirements for an EX8216 Switch to calculate the available power.
- If the **ON** LED does not blink still, remove the line card (see “Removing a Line Card from an EX8200 Switch” on page 218) and reinstall the line card (see “Installing a Line Card in an EX8200 Switch” on page 160).

2. If the **ON** LED blinks in green, but is not lit steadily, tighten the captive screws on the faceplate of the line card.

**Related Topics** • 8-port SFP+ Line Card in an EX8200 Switch on page 30

- 40-port SFP+ Line Card in an EX8200 Switch on page 31
- 48-port SFP Line Card in an EX8200 Switch on page 33
- 48-port RJ-45 Line Card in an EX8200 Switch on page 34

## PART 7

# Returning Hardware

- [Returning the Switch or Switch Components on page 241](#)



# Returning the Switch or Switch Components

- Returning an EX8200 Switch or Component for Repair or Replacement on page 241
- Locating the Serial Number on an EX8200 Switch or Component on page 242
- Contacting Customer Support to Obtain Return Materials Authorization for EX Series Switches on page 253
- Packing an EX8200 Switch or Component on page 254
- Packing a Line Card Used in an EX8200 Switch on page 259

## Returning an EX8200 Switch or Component for Repair or Replacement

---

If you need to return a switch or hardware component to Juniper Networks for repair or replacement, follow this procedure:

1. Determine the serial number of the component. For instructions, see “Locating the Serial Number on an EX8200 Switch or Component” on page 242.
2. Obtain an RMA number from JTAC as described in “Contacting Customer Support to Obtain Return Materials Authorization for EX Series Switches” on page 253.



**NOTE:** Do not return any component to Juniper Networks unless you have first obtained an RMA number. Juniper Networks reserves the right to refuse shipments that do not have an RMA. Refused shipments are returned to the customer through collect freight.

3. Pack the switch or component for shipping as described in “Packing an EX8200 Switch or Component” on page 254.

For more information about return and repair policies, see the customer support page at <http://www.juniper.net/support/guidelines.html>.

- Related Topics**
- EX8208 Switch Hardware Overview on page 3
  - EX8216 Switch Hardware Overview

## Locating the Serial Number on an EX8200 Switch or Component

If you are returning a switch or hardware component to Juniper Networks for repair or replacement, you must locate the serial number of the switch or component. You must provide the serial number to the Juniper Networks Technical Assistance Center (JTAC) when you contact them to obtain Return Materials Authorization (RMA). See “Contacting Customer Support to Obtain Return Materials Authorization for EX Series Switches” on page 253.

If the switch is operational and you can access the command-line interface (CLI), you can list serial numbers for the switch and for some components with a CLI command. If you do not have access to the CLI or if the serial number for the component does not appear in the command output, you can locate the serial number ID label on the physical switch or component.



**NOTE:** If you want to find the serial number on the physical switch component, you will need to remove the component from the switch chassis, for which you must have the required parts and tools available. See “Installing and Removing EX8208 Switch Hardware Components” on page 149 or [Installing and Removing EX8216 Switch Hardware Components](#).

1. Listing the Switch and Components Details with the CLI on page 242
2. Locating the Serial Number ID Label on an EX8200 Switch Chassis on page 244
3. Locating Serial Number ID Labels on FRU Components on page 246

### Listing the Switch and Components Details with the CLI

To list the switch and switch components and their serial numbers, use the **show chassis hardware** CLI command:

The following output lists the switch components and serial numbers for an EX8208 switch:

```
user@switch> show chassis hardware
Hardware inventory:
Item          Version  Part number  Serial number  Description
Chassis       REV 01    710-022044   BT0307470122  EX8208
Backplane     REV 01    710-022044   BT0307470122  EX8208-BP-S
CB 0          REV 07    710-020635   BE0108230079  EX8208-SRE320
  Routing Engine 0    BUILTIN     BUILTIN       RE-EX8208
CB 1          REV 01    710-020635   BE0108030010  EX8208-SRE320
  Routing Engine 1    BUILTIN     BUILTIN       RE-EX8208
CB 2          REV 07    710-021502   AZ0108200057  EX8208-SF320
FPC 3         REV 08    710-016837   BB0108270097  EX8200-8XS
  CPU         REV 06    710-020598   BF0108250177  EX8200-CPU
  PIC 0       BUILTIN     BUILTIN       8x 10GE SFP+
    Xcvr 0     REV 01    740-021308   88D709A00110  SFP+-10G-SR
    Xcvr 1     REV 01    740-021308   88D709A00249  SFP+-10G-SR
    Xcvr 2     REV 01    740-021308   88D709A00099  SFP+-10G-SR
    Xcvr 3     REV 01    740-021308   88D709A00139  SFP+-10G-SR
    Xcvr 4     REV 01    740-021308   88D709A00246  SFP+-10G-SR
    Xcvr 5     REV 01    740-021308   88D709A00126  SFP+-10G-SR
```



Xcvr 6	REV 01	740-021308	88D709A00136	SFP+-10G-SR
Xcvr 7	REV 01	740-021308	88D709A00137	SFP+-10G-SR
PSU 3	REV 04	740-021466	BG0708390050	EX8200-AC2K
PSU 4	REV 04	740-021466	BG0708390054	EX8200-AC2K
Fan Tray				
FTC 0				
FTC 1				

The following output lists the switch components and serial numbers for an EX8216 switch:

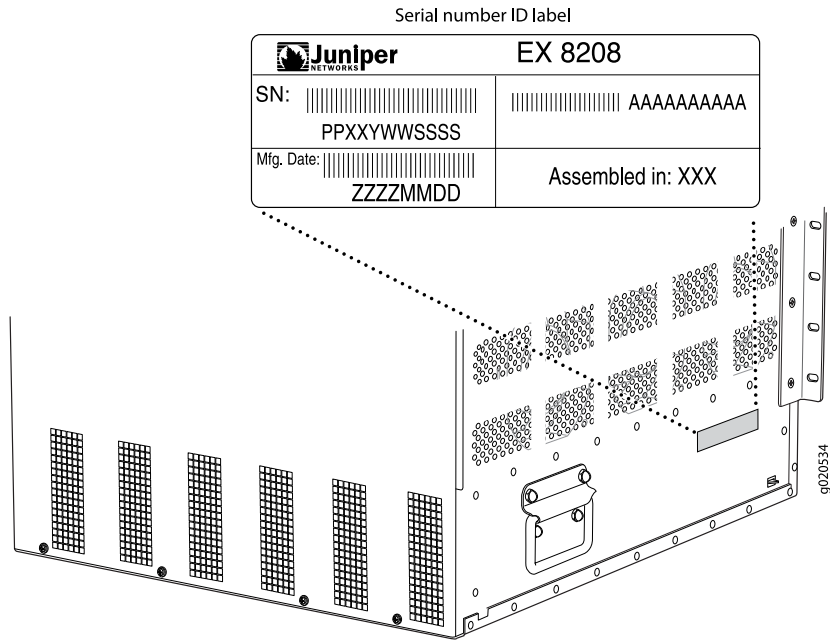
```
user@switch> show chassis hardware
Hardware inventory:
Item          Version  Part number  Serial number  Description
Chassis      REV 05                    EX8216
Midplane    REV 05   710-016845  BA0908390026  EX8216-MP
CB 0        REV 11   710-020771  AX0108370040  EX8216-RE320
  Routing Engine 0      BUILTIN    BUILTIN      RE-EX8216
CB 1        REV 11   710-020771  AX0108370027  EX8216-RE320
  Routing Engine 1      BUILTIN    BUILTIN      RE-EX8216
FPC 9       REV 06   710-020680  BD0108160009  EX8200-48T
  CPU       REV 03   710-020598  AE0108150045  EX8200-CPU
  PIC 0     BUILTIN    BUILTIN      48x 10/100/1000 Base-T
FPC 10      REV 08   710-016837  BB0108270097  EX8200-8XS
  CPU
FPC 13      REV 06   710-016837  BB0108160016  EX8200-8XS
  CPU       REV 03   710-020598  AE0108150079  EX8200-CPU
  PIC 0     BUILTIN    BUILTIN      8x 10GE SFP+
    Xcvr 0   REV 01   740-021308  83D303A00092  SFP+-10G-SR
    Xcvr 2   REV 01   740-021308  87D709A00153  SFP+-10G-S
FPC 14      REV 08   710-016837  BB0108270115  EX8200-8XS
  CPU       REV 06   710-020598  BF0108260254  EX8200-CPU
  PIC 0     BUILTIN    BUILTIN      8x 10GE SFP+
    Xcvr 0   REV 01   740-021308  87D709A00037  SFP+-10G-SR
    Xcvr 2   REV 01   740-021308  87D709A00063  SFP+-10G-SR
FPC 15      REV 05   710-020683  BC0108170021  EX8200-48F
  CPU       REV 01   710-020598  BF0107510006  EX8200-CPU
  PIC 0     BUILTIN    BUILTIN      48x 100 Base-FX/1000
Base-X
  Xcvr 0    REV 01   740-011613  E08E04433    SFP-SX
  Xcvr 1    REV 01   740-011613  E08E04378    SFP-SX
  Xcvr 2    REV 01   740-011613  E08E04364    SFP-SX
  Xcvr 3    REV 01   740-011613  E08E04380    SFP-SX
  Xcvr 4    REV 01   740-011613  E08E04374    SFP-SX
  Xcvr 5    REV 01   740-011613  E08E04385    SFP-SX
  Xcvr 6    REV 01   740-011613  E08E04362    SFP-SX
  Xcvr 7    REV 01   740-011613  E08E04371    SFP-SX
  Xcvr 8    REV 01   740-011613  E08E04376    SFP-SX
  Xcvr 9    REV 01   740-011613  E08E04367    SFP-SX
  Xcvr 10   REV 01   740-011613  E08E04384    SFP-SX
  Xcvr 11   REV 01   740-011613  E08E04377    SFP-SX
  Xcvr 12   REV 01   740-011613  E08E04373    SFP-SX
  Xcvr 13   REV 01   740-011613  E08E04369    SFP-SX
  Xcvr 14   REV 01   740-011613  E08E04361    SFP-SX
  Xcvr 15   REV 01   740-011613  E08E04379    SFP-SX
  Xcvr 16   REV 01   740-011613  E08E04372    SFP-SX
  Xcvr 17   REV 01   740-011613  E08E04431    SFP-SX
  Xcvr 18   REV 01   740-011613  E08E04382    SFP-SX
  Xcvr 19   REV 01   740-011613  E08E04386    SFP-SX
  Xcvr 20   REV 01   740-011613  E08E04435    SFP-SX
  Xcvr 21   REV 01   740-011613  E08E04375    SFP-SX
  Xcvr 22   REV 01   740-011613  E08E04365    SFP-SX
```

Xcvr 23	REV 01	740-011613	E08E04370	SFP-SX
Xcvr 24	REV 01	740-011613	E08C02744	SFP-SX
Xcvr 25	REV 01	740-011613	E08E04432	SFP-SX
Xcvr 26	REV 01	740-011613	E08C02583	SFP-SX
Xcvr 27	REV 01	740-011613	E08E04381	SFP-SX
Xcvr 28	REV 01	740-011613	E08C02582	SFP-SX
Xcvr 29	REV 01	740-011613	E08E04368	SFP-SX
Xcvr 30	REV 01	740-011613	E08E04346	SFP-SX
Xcvr 31	REV 01	740-011613	E08E04396	SFP-SX
Xcvr 32	REV 01	740-011613	E08C02584	SFP-SX
Xcvr 33	REV 01	740-011613	E08E04395	SFP-SX
Xcvr 34	REV 01	740-011613	E08E04350	SFP-SX
Xcvr 35	REV 01	740-011613	E08E04391	SFP-SX
Xcvr 36	REV 01	740-011613	E08E04437	SFP-SX
Xcvr 37	REV 01	740-011613	E08E04389	SFP-SX
Xcvr 38	REV 01	740-011613	E08E04356	SFP-SX
Xcvr 39	REV 01	740-011613	E08E04383	SFP-SX
Xcvr 40	REV 01	740-011613	E08E04357	SFP-SX
Xcvr 41	REV 01	740-011613	E08E04434	SFP-SX
Xcvr 42	REV 01	740-011613	E08E04351	SFP-SX
Xcvr 43	REV 01	740-011613	E08E04366	SFP-SX
Xcvr 44	REV 01	740-011613	E08E04388	SFP-SX
Xcvr 45	REV 01	740-011613	E08E04387	SFP-SX
Xcvr 46	REV 01	740-011613	E08E04390	SFP-SX
Xcvr 47	REV 01	740-011613	E08E03899	SFP-SX
SIB 0	REV 02	710-021613	AY0108210025	EX8216-SF320
SIB 1	REV 02	710-021613	AY0108210022	EX8216-SF320
SIB 2	REV 02	710-021613	AY0108210010	EX8216-SF320
SIB 3	REV 02	710-021613	AY0108210008	EX8216-SF320
SIB 4	REV 02	710-021613	AY0108210015	EX8216-SF320
SIB 5	REV 05	710-021613	AY0108350042	EX8216-SF320
SIB 6	REV 05	710-021613	AY0108360190	EX8216-SF320
SIB 7	REV 05	710-021613	AY0108350154	EX8216-SF320
PSU 0	REV 04	740-021466	BG0708390040	EX8200-AC2K
PSU 2	REV 01	740-021466	BG0700000000	EX8200-AC2K
PSU 4	REV 02	740-021466	BG070820002G	EX8200-AC2K
Top Fan Tray				
FTC 0	REV 05	760-022620	AE0108310233	EX8216-FT
FTC 1	REV 05	760-022620	AE0108310208	EX8216-FT
Bottom Fan Tray				
FTC 0	REV 05	760-022620	AE0108310177	EX8216-FT
FTC 1	REV 05	760-022620	AE0108310123	EX8216-FT

## Locating the Serial Number ID Label on an EX8200 Switch Chassis

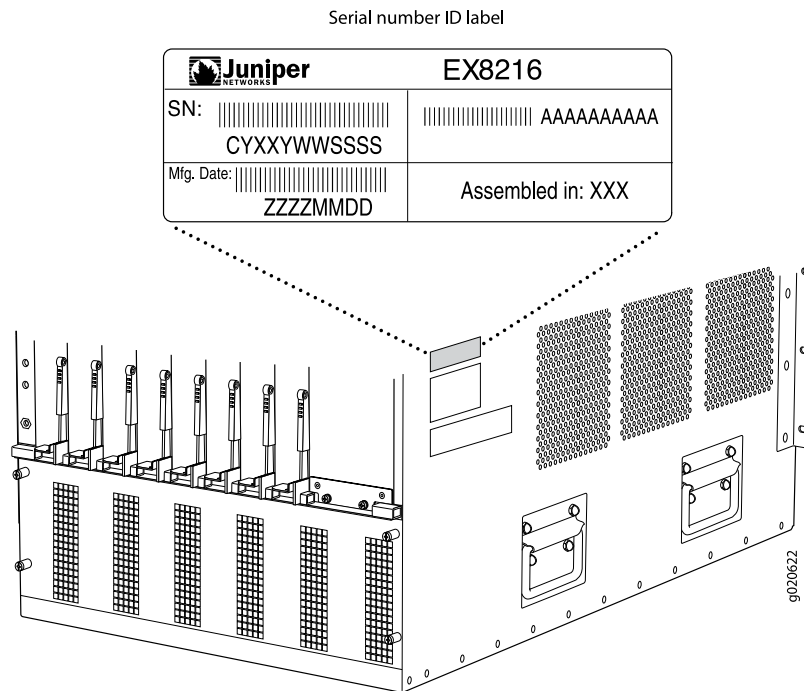
The serial number ID label is located near the bottom on the left side of the chassis on an EX8208 switch. See Figure 96 on page 245.

Figure 96: Location of the Serial Number ID Label on EX8208 Switch Chassis



The serial number ID label is located near the bottom on the left side of the chassis on an EX8216 switch. See Figure 97 on page 245.

Figure 97: Location of the Serial Number ID Label on EX8216 Switch Chassis

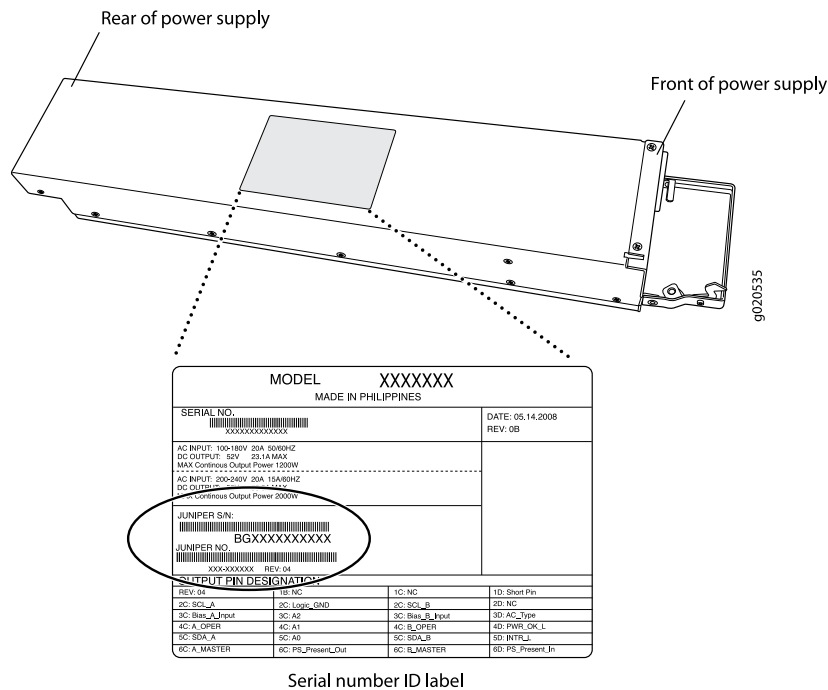


## Locating Serial Number ID Labels on FRU Components

The power supplies, fan tray, SRE modules, RE modules, SF module, and line cards installed in an EX8200 switch are field-replaceable units (FRUs). For each of these FRUs, you must remove the FRU from the switch chassis to see the FRU's serial number ID label.

- 2000 W AC Power supply—The serial number ID label is on the left side of the power supply (see Figure 98 on page 246). See “Removing an AC Power Supply from an EX8200 Switch” on page 207.

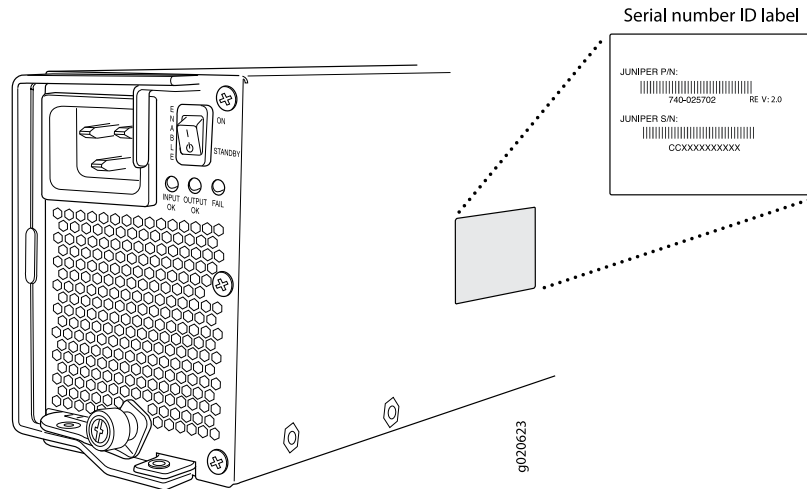
**Figure 98: Location of the Serial Number ID Label on a 2000 W AC Power Supply**



Serial number ID label

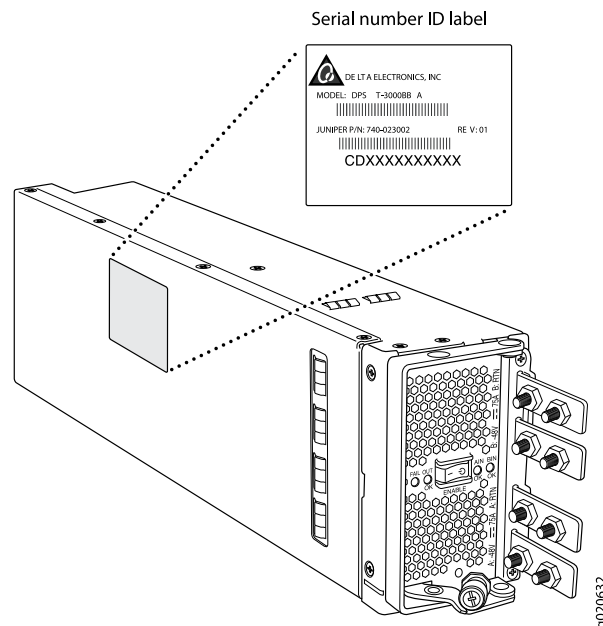
- 3000 W AC Power supply—The serial number ID label is on the right side of the power supply (see Figure 99 on page 247). See “Removing an AC Power Supply from an EX8200 Switch” on page 207.

**Figure 99: Location of the Serial Number ID Label on a 3000 W AC Power Supply**



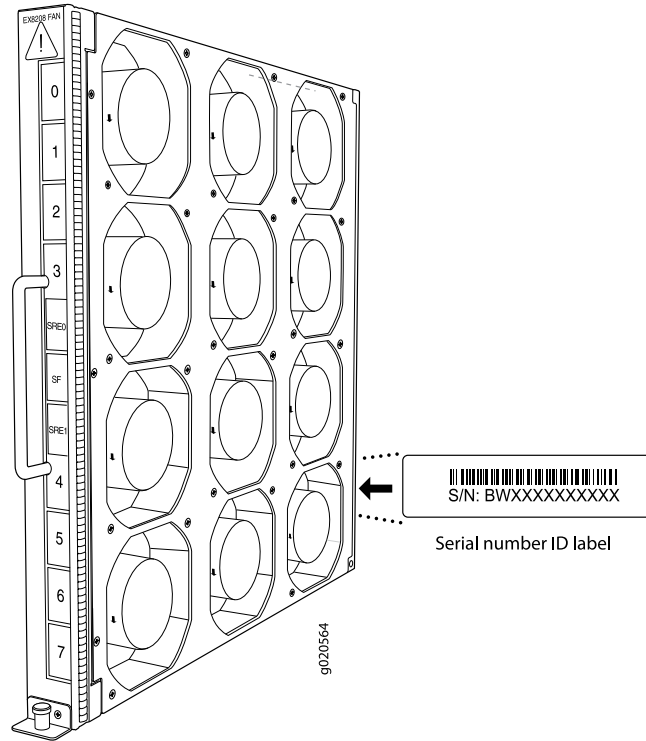
- DC Power supplies—The serial number ID label is on the left side of the DC power supply (see Figure 100 on page 247). See “Removing a DC Power Supply from an EX8200 Switch” on page 209.

**Figure 100: Location of the Serial Number ID Label on 2000 W DC Power Supply and 3000 W DC Power Supply**



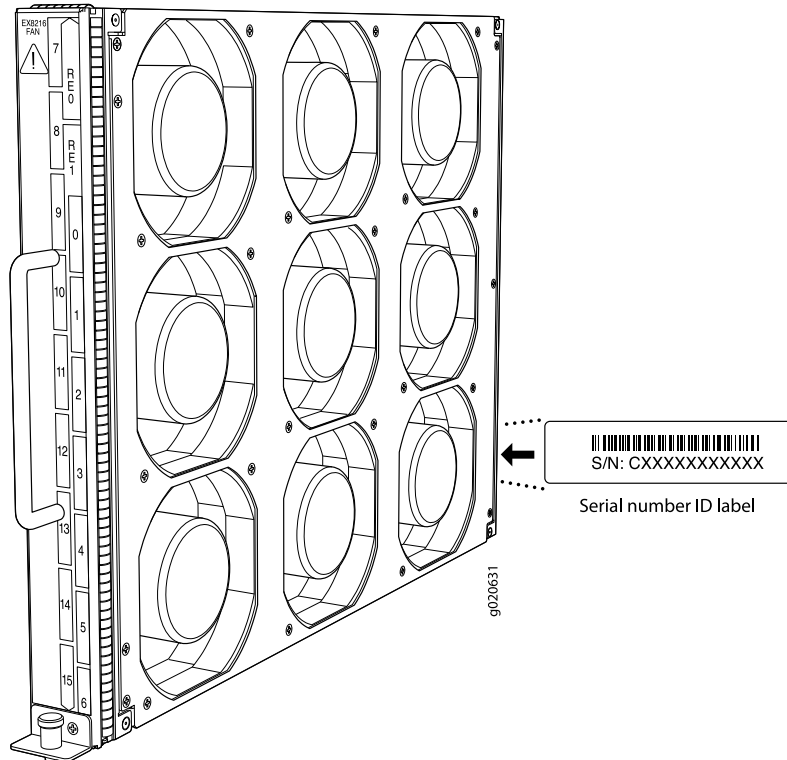
- Fan tray in an EX8208 switch—The serial number ID label is on the rear of the fan tray (see Figure 101 on page 248). See “Removing a Fan Tray from an EX8208 Switch” on page 211.

Figure 101: Location of the Serial Number ID label on the Fan Tray Used in an EX8208 Switch



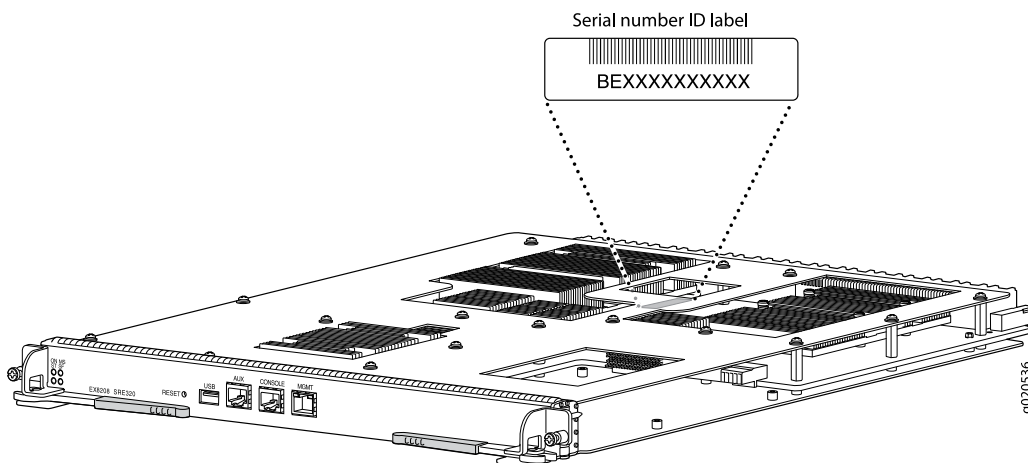
- Fan trays in an EX8216 switch—The serial number ID label is on the rear of each fan tray (see Figure 102 on page 249). See Removing a Fan Tray from an EX8216 Switch.

**Figure 102: Location of the Serial Number ID label on the Fan Tray Used in an EX8216 Switch**



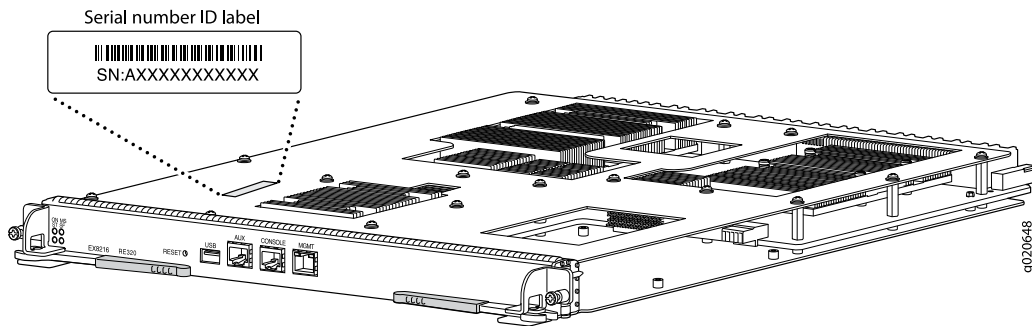
- Switch Fabric and Routing Engine (SRE) module in an EX8208 Switch— See Figure 103 on page 249 to see the location of the serial number ID label on the SRE module. See “Removing an SRE Module from an EX8208 Switch” on page 215.

**Figure 103: Location of the Serial Number ID Label on the SRE Module**



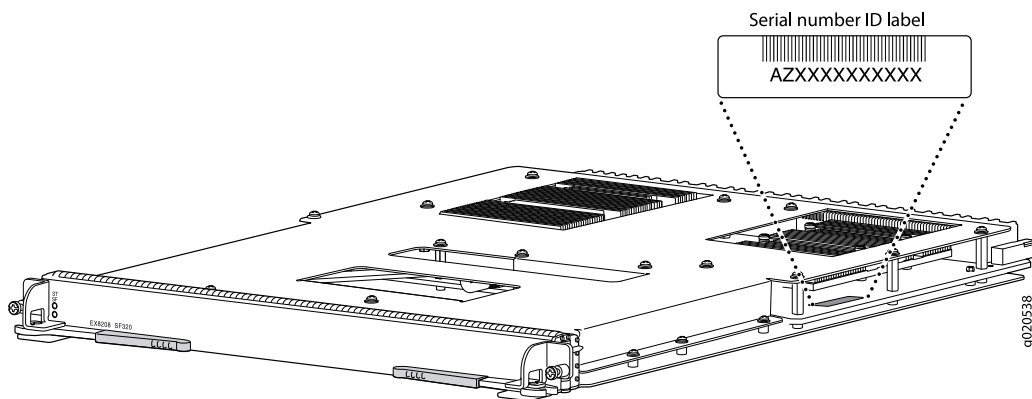
- Routing Engine (RE) module in an EX8216 Switch— See Figure 104 on page 250 to see the location of the serial number ID label on the RE module. See Removing an RE Module from an EX8216 Switch.

Figure 104: Location of the Serial Number ID Label on the RE Module



- Switch Fabric (SF) module in an EX8208 switch— See Figure 105 on page 250 to see the location of the serial number ID label on the SF module. See “Removing an SF Module from an EX8208 Switch” on page 217.

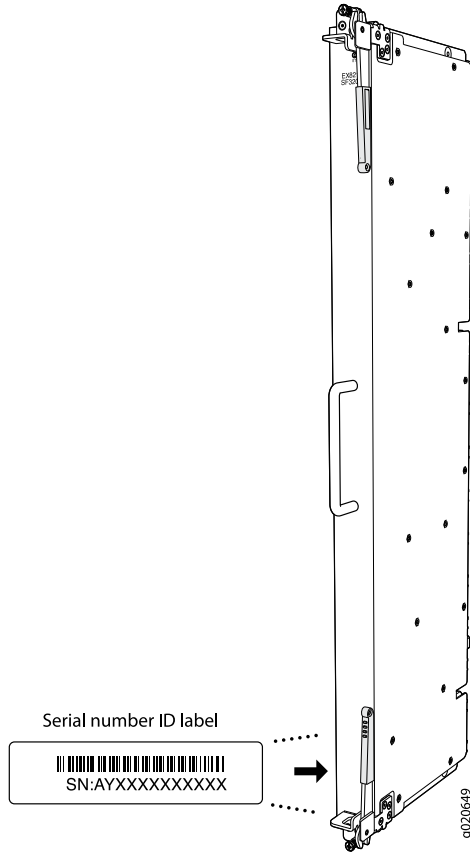
Figure 105: Location of the Serial Number ID Label on the SF Module Used in an EX8208 Switch



- Switch Fabric (SF) module in an EX8216 switch— See Figure 106 on page 251 to see the location of the serial number ID label on the SF module. See Removing an SF Module from an EX8216 Switch.

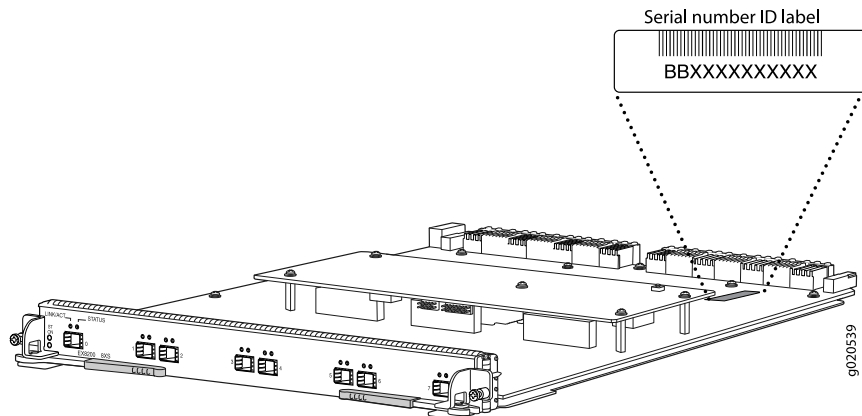


Figure 106: Location of the Serial Number ID Label on the SF Module Used in an EX8216 Switch



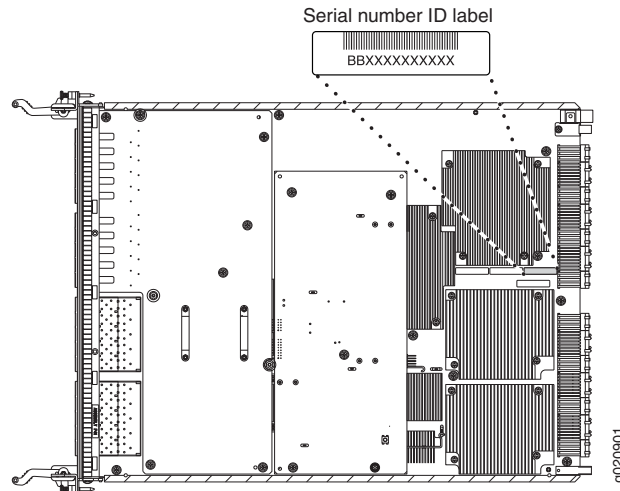
- 8-port SFP+ line card—See Figure 107 on page 251 to see the location of the serial number ID label on this line card. See “Removing a Line Card from an EX8200 Switch” on page 218.

Figure 107: Location of the Serial Number ID Label on the 8-Port SFP+ Line Card



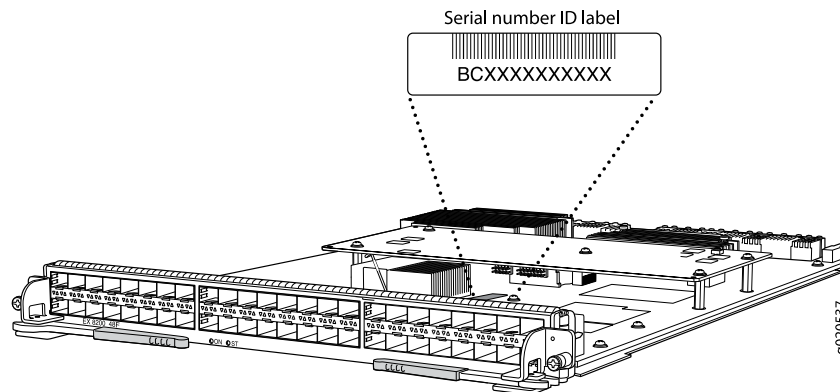
- 40-port SFP+ line card—See Figure 108 on page 252 to see the location of the serial number ID label on this line card. See “Removing a Line Card from an EX8200 Switch” on page 218.

**Figure 108: Location of the Serial Number ID Label on the 40-Port SFP+ Line Card**



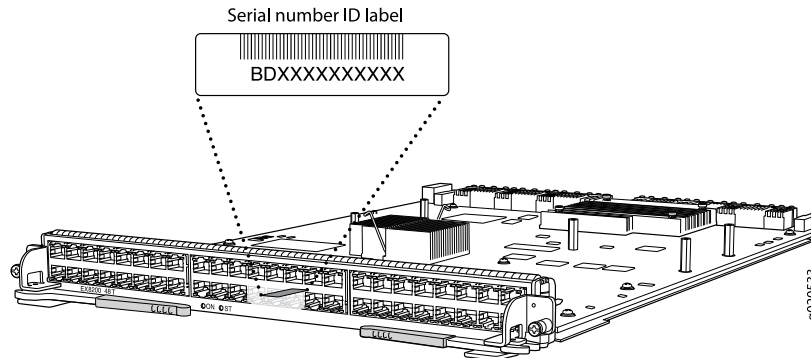
- 48-port SFP line card—See Figure 109 on page 252 to see the location of the serial number ID label on this line card. See “Removing a Line Card from an EX8200 Switch” on page 218.

**Figure 109: Location of the Serial Number ID label on the 48-Port SFP Line Card**



- 48-port RJ-45 line card—See Figure 110 on page 253 to see the location of the serial number ID label on this line card. See “Removing a Line Card from an EX8200 Switch” on page 218.

**Figure 110: Location of the Serial Number ID Label on the 48-Port RJ-45 Line Card**



- Related Topics**
- Contacting Customer Support to Obtain Return Materials Authorization for EX Series Switches on page 253
  - Returning an EX8200 Switch or Component for Repair or Replacement on page 241

## Contacting Customer Support to Obtain Return Materials Authorization for EX Series Switches

If you are returning a switch or hardware component to Juniper Networks for repair or replacement, obtain a Return Materials Authorization (RMA) from Juniper Networks Technical Assistance Center (JTAC).

After locating the serial number of the switch or hardware component you want to return, open a Case with Juniper Networks Technical Assistance Center (JTAC) on the Web or by telephone.

For instructions on locating the serial number of the switch or hardware component you want to return:

- See Locating the Serial Number on an EX2200 Switch or Component.
- See Locating the Serial Number on an EX3200 or EX4200 Switch or Component.
- See Locating the Serial Number on an EX4500 Switch or Component.
- See “Locating the Serial Number on an EX8200 Switch or Component” on page 242.

Before you request an RMA from JTAC, be prepared to provide the following information:

- Your existing case number, if you have one
- Serial number of the component
- Your name, organization name, telephone number, fax number, and shipping address
- Details of the failure or problem
- Type of activity being performed on the switch when the problem occurred
- Configuration data displayed by one or more **show** commands

You can contact JTAC 24 hours a day, seven days a week on the Web or by telephone:

- Case Manager at CSC: <http://www.juniper.net/cm/>
- Telephone: +1-888-314-JTAC1-888-314-5822, toll free in U.S., Canada, and Mexico



NOTE: For international or direct-dial options in countries without toll free numbers, see <http://www.juniper.net/support/requesting-support.html>.

If you are contacting JTAC by telephone, enter your 11-digit case number followed by the pound (#) key for an existing case, or press the star (\*) key to be routed to the next available support engineer.

The support representative validates your request and issues an RMA number for return of the component.

#### Related Topics

- Packing an EX2200 Switch or Component for Shipping
- Packing an EX3200 or EX4200 Switch or Component for Shipping
- Packing an EX4500 Switch or Component for Shipping
- Packing an EX8200 Switch or Component on page 254
- Returning an EX2200 Switch or Component for Repair or Replacement
- Returning an EX3200 or EX4200 Switch or Component for Repair or Replacement
- Returning an EX4500 Switch or Component for Repair or Replacement
- Returning an EX8200 Switch or Component for Repair or Replacement on page 241

## Packing an EX8200 Switch or Component

---

If you are returning an EX8200 switch or component to Juniper Networks for repair or replacement, pack the item as described in this topic.

Before you begin packing the switch or component, ensure you have:

- Followed all the steps listed in “Contacting Customer Support to Obtain Return Materials Authorization for EX Series Switches” on page 253.
- Retrieved the original shipping carton and packing materials. Contact your JTAC representative if you do not have these materials, to learn about approved packing materials. See “Contacting Customer Support to Obtain Return Materials Authorization for EX Series Switches” on page 253.
- Ensure you understand how to prevent ESD damage. See “Prevention of Electrostatic Discharge Damage on EX Series Switches” on page 292.

This topic describes:

1. Packing an EX8200 Switch on page 255
2. Packing EX8200 Switch Components for Shipping on page 258

## Packing an EX8200 Switch

If you need to transport the switch to another location or return the switch to Juniper Networks, you need to pack the switch securely in its original packaging to prevent damage during transportation.

Before you pack the switch:

1. Power off the switch. See “Powering Off an EX8200 Switch” on page 199.
2. Remove all wires, plugs, and power cords from the switch.
3. Remove all line cards and pack them in their original shipping containers. See “Packing a Line Card Used in an EX8200 Switch” on page 259.
4. Install cover panels over blank slots.

Leave components that came installed in the chassis in the chassis.



**NOTE:** Any line cards ordered with the switch are shipped separately. Do not pack any line cards with the switch.

Ensure that you have the following parts and tools available to pack the switch:

- A 7/16-in. or 11-mm open-end or socket wrench to install the bracket bolts on the chassis and shipping pallet
- The original switch packing material (wooden pallet, cardboard box, accessory box and its contents, foam padding, and brackets and bracket bolts for attaching the chassis to the pallet)
- Electrostatic discharge (ESD) grounding strap

The EX8200 switch is shipped in a cardboard box that has a two-layer wooden pallet base with foam cushioning between the layers. The switch chassis is bolted to the pallet base with 4 pallet fasteners, 2 on each side of the chassis.



**CAUTION:** The switch is maximally protected inside the shipping box. Pack the switch only in its original shipping box, securely bolted to the original wooden shipping pallet. Do not pack the switch in anything except its original container or the switch might be damaged in transit.

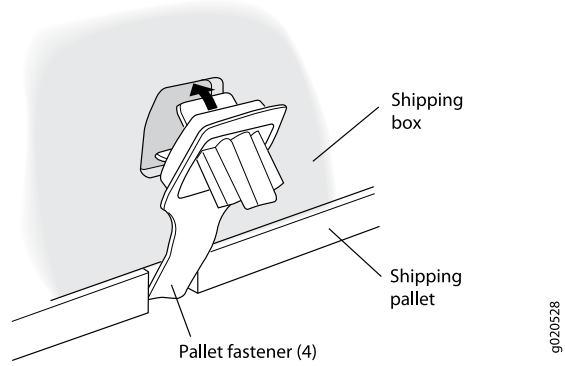
To pack the switch (see Figure 112 on page 258):

1. Move the wooden pallet and packing material to a staging area as close to the switch as possible. Make sure there is enough space to move the chassis from the rack or cabinet to the wooden pallet.
2. Remove the switch from the rack or cabinet. For EX8208 switches, see “Removing an EX8208 Switch from a Rack or Cabinet Using a Mechanical Lift” on page 202 or “Removing an EX8208 Switch from a Rack or Cabinet Without Using a Mechanical Lift” on page 203). For EX8216 switches, see Removing an EX8216 Switch from a Rack or Cabinet.

Move the chassis to the shipping pallet (see “Chassis Lifting Guidelines for EX8200 Switches” on page 276). Position the switch on the pallet so that the front of the switch is facing the silkscreened “front” mark on the pallet. The pallet also has crop marks to guide you in positioning the chassis.

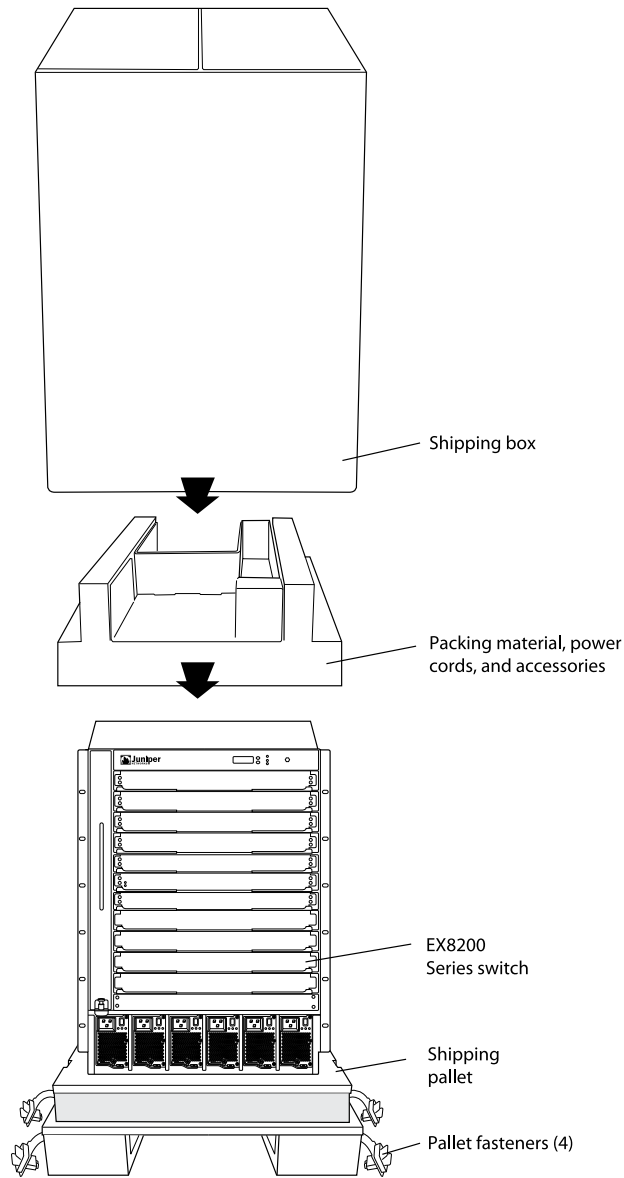
3. Use the 7/16-in. or 11-mm open-end or socket wrench to install the four sets of brackets and bolts that secure the chassis to the wooden pallet.
4. Slide the plastic cover over the switch chassis. The plastic cover is part of the switch's original packing materials.
5. Replace the foam padding on top of the chassis.
6. Place the power cords in the box.
7. Remove the adjustable mounting brackets from the rack or cabinet and place them and their connecting screws in the accessory box.
8. Place the accessory box in its slot in the foam padding. See “Parts Inventory (Packing List) for an EX8208 Switch” on page 130 or Parts Inventory (Packing List) for an EX8216 Switch to verify that you have included all the proper contents of the accessory box.
9. Slide the cardboard box over the chassis, making sure that the arrows on the box point up and the pallet fasteners to secure the cardboard box to the wooden pallet are near the bottom.
10. Attach the cardboard box to the wooden pallet using the four pallet fasteners attached to the pallet. See Figure 111 on page 257. Squeeze together the two ridges (“fins”) in the depression in each pallet fastener, then slide each fastener into its corresponding slot in the cardboard box and release the ridges to secure the latch.

Figure 111: Insert Pallet Fasteners in the Cardboard Box



11. Write the RMA number on the exterior of the box to ensure proper tracking.

Figure 112: Packing an EX8200 Switch



### Packing EX8200 Switch Components for Shipping

To pack EX8200 switch components, follow the instructions here. For instructions to pack line cards, see “Packing a Line Card Used in an EX8200 Switch” on page 259.

Before you begin packing a switch component, ensure that you have the following parts and tools available:

- Antistatic bag, one for each component
- Electrostatic discharge (ESD) grounding strap





**CAUTION:** Do not stack switch components. Return individual components in separate boxes if they do not fit together on one level in the shipping box.

To pack EX8200 switch components:

- Place individual components in antistatic bags.
- Use the original packing materials if they are available. If the original packing materials are not available, ensure the component is adequately packed to prevent damage during transit. The packing material you use must be able to support the weight of the component.
- Ensure that the components are adequately protected by wrapping them well with packing materials. Pack the component in an oversized box (if the original box is not available) with extra packing material around the unit so that the component is prevented from moving around inside the box.
- Securely tape the box closed.
- Write the RMA number on the exterior of the box to ensure proper tracking.

- Related Topics**
- Returning an EX8200 Switch or Component for Repair or Replacement on page 241
  - Parts Inventory (Packing List) for an EX8208 Switch on page 130
  - Parts Inventory (Packing List) for an EX8216 Switch

## Packing a Line Card Used in an EX8200 Switch

If you are returning a line card to Juniper Networks for repair or replacement, pack it as described in this topic.

Before you begin packing a line card:

- Ensure that you have taken the necessary precautions to prevent ESD damage (see “Prevention of Electrostatic Discharge Damage on EX Series Switches” on page 292).
- Ensure that you know how to handle and store the line card (see “Handling and Storing Line Cards in EX8200 Switches” on page 227).
- Retrieve the original shipping carton and packing materials. Contact your JTAC representative if you do not have these materials, to learn about approved packing materials. See “Contacting Customer Support to Obtain Return Materials Authorization for EX Series Switches” on page 253.
- Obtain an antistatic bag.



**CAUTION:** Do not stack line cards on top of one another or on top of any other component. Place each line card separately in an antistatic bag.

To pack a line card:

1. Place the line card in the antistatic bag.
2. Place the line card in the shipping carton.
3. Place the packing foam on top of and around the line card.
4. Close the top of the cardboard shipping box and seal it with packing tape.
5. Write the RMA number on the exterior of the box to ensure proper tracking.

- Related Topics**
- Returning an EX8200 Switch or Component for Repair or Replacement on page 241
  - Removing a Line Card from an EX8200 Switch on page 218

## PART 8

# Safety Information

- General Safety Information on page 263
- Radiation and Laser Warnings on page 269
- Installation and Maintenance Safety Information on page 275
- Power and Electrical Safety Information on page 291



# General Safety Information

- General Safety Guidelines and Warnings for EX Series Switches on page 263
- Definitions of Safety Warning Levels for EX Series Switches on page 264
- Fire Safety Requirements for EX Series Switches on page 266
- Qualified Personnel Warning for EX Series Switches on page 267
- Warning Statement for Norway and Sweden for EX Series Switches on page 268

## General Safety Guidelines and Warnings for EX Series Switches

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The following guidelines help ensure your safety and protect the EX Series switch from damage. The list of guidelines might not address all potentially hazardous situations in your working environment, so be alert and exercise good judgment at all times.

- Perform only the procedures explicitly described in the hardware documentation for this product. Make sure that only authorized service personnel perform other system services.
- Keep the area around the chassis clear and free from dust before, during, and after installation.
- Keep tools away from areas where people could trip over them while walking.
- Do not wear loose clothing or jewelry, such as rings, bracelets, or chains, which could become caught in the chassis.
- Wear safety glasses if you are working under any conditions that could be hazardous to your eyes.
- Do not perform any actions that create a potential hazard to people or make the equipment unsafe.
- Never attempt to lift an object that is too heavy for one person to handle.
- Never install or manipulate wiring during electrical storms.
- Never install electrical jacks in wet locations unless the jacks are specifically designed for wet environments.
- Operate the EX Series switch only when it is properly grounded.
- Ensure that the separate protective earthing terminal provided on this product is permanently connected to earth.

- Replace fuses only with fuses of the same type and rating.
- Do not open or remove chassis covers or sheet-metal parts unless instructions are provided in the hardware documentation for this product. Such an action could cause severe electrical shock.
- Do not push or force any objects through any opening in the chassis frame. Such an action could result in electrical shock or fire.
- Avoid spilling liquid onto the EX Series switch chassis or onto any switch component. Such an action could cause electrical shock or damage the switch.
- Avoid touching uninsulated electrical wires or terminals that have not been disconnected from their power source. Such an action could cause electrical shock.
- Always ensure that all modules, power supplies, and cover panels are fully inserted and that the installation screws are fully tightened.

**Related Topics**

- AC Power Electrical Safety Guidelines for EX Series Switches on page 294
- DC Power Electrical Safety Guidelines for EX Series Switches on page 296
- General Electrical Safety Guidelines and Warnings for EX Series Switches on page 291
- Maintenance and Operational Safety Guidelines and Warnings for EX Series Switches on page 282
- Laser and LED Safety Guidelines and Warnings for EX Series Switches on page 269
- Installation Instructions Warning for EX Series Switches on page 275
- Grounded Equipment Warning for EX Series Switches on page 282

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## Definitions of Safety Warning Levels for EX Series Switches

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The documentation for EX Series switches uses the following levels of safety warnings (there are two “Warning” formats):



NOTE: You might find this information helpful in a particular situation, or you might overlook this important information if it was not highlighted in a Note.



CAUTION: You need to observe the specified guidelines to avoid minor injury or discomfort to you or severe damage to the EX Series switch.



WARNING: This symbol alerts you to the risk of personal injury from a laser.



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WARNING: This symbol means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents.

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WARNING: **Waarschuwing** Dit waarschuwingssymbool betekent gevaar. U verkeert in een situatie die lichamelijk letsel kan veroorzaken. Voordat u aan enige apparatuur gaat werken, dient u zich bewust te zijn van de bij elektrische schakelingen betrokken risico's en dient u op de hoogte te zijn van standaard maatregelen om ongelukken te voorkomen.

.....



.....

WARNING: **Varoitus** Tämä varoitusmerkki merkitsee vaaraa. Olet tilanteessa, joka voi johtaa ruumiinvammaan. Ennen kuin työskentelet minkään laitteiston parissa, ota selvää sähkökytkentöihin liittyvistä vaaroista ja tavanomaisista onnettomuuksien ehkäisykeinoista.

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WARNING: **Attention** Ce symbole d'avertissement indique un danger. Vous vous trouvez dans une situation pouvant causer des blessures ou des dommages corporels. Avant de travailler sur un équipement, soyez conscient des dangers posés par les circuits électriques et familiarisez-vous avec les procédures couramment utilisées pour éviter les accidents.

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WARNING: **Warnung** Dieses Warnsymbol bedeutet Gefahr. Sie befinden sich in einer Situation, die zu einer Körperverletzung führen könnte. Bevor Sie mit der Arbeit an irgendeinem Gerät beginnen, seien Sie sich der mit elektrischen Stromkreisen verbundenen Gefahren und der Standardpraktiken zur Vermeidung von Unfällen bewußt.

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WARNING: **Avvertenza** Questo simbolo di avvertenza indica un pericolo. La situazione potrebbe causare infortuni alle persone. Prima di lavorare su qualsiasi apparecchiatura, occorre conoscere i pericoli relativi ai circuiti elettrici ed essere al corrente delle pratiche standard per la prevenzione di incidenti.

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WARNING: **Advarsel** Dette varselsymbolet betyr fare. Du befinner deg i en situasjon som kan føre til personskade. Før du utfører arbeid på utstyr, må du være oppmerksom på de faremomentene som elektriske kretser innebærer, samt gjøre deg kjent med vanlig praksis når det gjelder å unngå ulykker.

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WARNING: **Aviso** Este símbolo de aviso indica perigo. Encontra-se numa situação que lhe poderá causar danos físicos. Antes de começar a trabalhar com qualquer

equipamento, familiarize-se com os perigos relacionados com circuitos eléctricos, e com quaisquer práticas comuns que possam prevenir possíveis acidentes.



WARNING: ¡Atención! Este símbolo de aviso significa peligro. Existe riesgo para su integridad física. Antes de manipular cualquier equipo, considerar los riesgos que entraña la corriente eléctrica y familiarizarse con los procedimientos estándar de prevención de accidentes.



WARNING: **Varning!** Denna varningssymbol signalerar fara. Du befinner dig i en situation som kan leda till personskada. Innan du utför arbete på någon utrustning måste du vara medveten om farorna med elkretsar och känna till vanligt förfarande för att förebygga skador.

#### Related Topics

- Warning Statement for Norway and Sweden for EX Series Switches on page 268
- General Safety Guidelines and Warnings for EX Series Switches on page 263
- Installation Instructions Warning for EX Series Switches on page 275
- Maintenance and Operational Safety Guidelines and Warnings for EX Series Switches on page 282
- Grounded Equipment Warning for EX Series Switches on page 282
- Laser and LED Safety Guidelines and Warnings for EX Series Switches on page 269

## Fire Safety Requirements for EX Series Switches

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In the event of a fire emergency involving switches and other network equipment, the safety of people is the primary concern. You should establish procedures for protecting people in the event of a fire emergency, provide safety training, and properly provision fire-control equipment and fire extinguishers.

In addition, you should establish procedures to protect your equipment in the event of a fire emergency. Juniper Networks products should be installed in an environment suitable for electronic equipment. We recommend that fire suppression equipment be available in the event of a fire in the vicinity of the equipment and that all local fire, safety, and electrical codes and ordinances be observed when installing and operating your equipment.

### Fire Suppression

In the event of an electrical hazard or an electrical fire, you should first turn power off to the equipment at the source. Then use a Type C fire extinguisher, which uses noncorrosive fire retardants, to extinguish the fire.

### Fire Suppression Equipment



Type C fire extinguishers, which use noncorrosive fire retardants such as carbon dioxide and Halotron™, are most effective for suppressing electrical fires. Type C fire extinguishers displace oxygen from the point of combustion to eliminate the fire. For extinguishing fire on or around equipment that draws air from the environment for cooling, you should use this type of inert oxygen displacement extinguisher instead of an extinguisher that leaves residues on equipment.

Do not use multipurpose Type ABC chemical fire extinguishers (dry chemical fire extinguishers). The primary ingredient in these fire extinguishers is monoammonium phosphate, which is very sticky and difficult to clean. In addition, in the presence of minute amounts of moisture, monoammonium phosphate can become highly corrosive and corrodes most metals.

Any equipment in a room in which a chemical fire extinguisher has been discharged is subject to premature failure and unreliable operation. The equipment is considered to be irreparably damaged.



**NOTE:** To keep warranties effective, do not use a dry chemical fire extinguisher to control a fire at or near a Juniper Networks switch. If a dry chemical fire extinguisher is used, the unit is no longer eligible for coverage under a service agreement.

We recommend that you dispose of any irreparably damaged equipment in an environmentally responsible manner.

- Related Topics**
- General Safety Guidelines and Warnings for EX Series Switches on page 263
  - General Electrical Safety Guidelines and Warnings for EX Series Switches on page 291
  - In Case of Electrical Accident: Action to Take on an EX Series Switch on page 303

## Qualified Personnel Warning for EX Series Switches



**WARNING:** Only trained and qualified personnel should install or replace the EX Series switch.

**Waarschuwing** Installatie en reparaties mogen uitsluitend door getraind en bevoegd personeel uitgevoerd worden.

**Varoitus** Ainoastaan koulutettu ja pätevä henkilökunta saa asentaa tai vaihtaa tämän laitteen.

**Attention** Tout installation ou remplacement de l'appareil doit être réalisé par du personnel qualifié et compétent.

**Warnung** Gerät nur von geschultem, qualifiziertem Personal installieren oder auswechseln lassen.

**Avvertenza** Solo personale addestrato e qualificato deve essere autorizzato ad installare o sostituire questo apparecchio.

**Advarsel** Kun kvalifisert personell med riktig opplæring bør montere eller bytte ut dette utstyret.

**Aviso** Este equipamento deverá ser instalado ou substituído apenas por pessoal devidamente treinado e qualificado.

**¡Atención!** Estos equipos deben ser instalados y reemplazados exclusivamente por personal técnico adecuadamente preparado y capacitado.

**Varning!** Denna utrustning ska endast installeras och bytas ut av utbildad och kvalificerad personal.

- 
- Related Topics**
- General Safety Guidelines and Warnings for EX Series Switches on page 263
  - General Electrical Safety Guidelines and Warnings for EX Series Switches on page 291
  - AC Power Electrical Safety Guidelines for EX Series Switches on page 294
  - DC Power Electrical Safety Guidelines for EX Series Switches on page 296

## Warning Statement for Norway and Sweden for EX Series Switches

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**WARNING:** The equipment must be connected to an earthed mains socket-outlet.  
**Advarsel** Apparatet skal kobles til en jordet stikkontakt.

**Varning!** Apparaten skall anslutas till jordat nätuttag.

- 
- Related Topics**
- General Safety Guidelines and Warnings for EX Series Switches on page 263

# Radiation and Laser Warnings

- Laser and LED Safety Guidelines and Warnings for EX Series Switches on page 269
- Radiation from Open Port Apertures Warning for EX Series Switches on page 272

## Laser and LED Safety Guidelines and Warnings for EX Series Switches

EX Series switches are equipped with laser transmitters, which are considered a Class 1 Laser Product by the U.S. Food and Drug Administration and are evaluated as a Class 1 Laser Product per EN 60825–1 requirements.

Observe the following guidelines and warnings:

- General Laser Safety Guidelines on page 269
- Class 1 Laser Product Warning on page 269
- Class 1 LED Product Warning on page 270
- Laser Beam Warning on page 270

### General Laser Safety Guidelines

When working around ports that support optical transceivers, observe the following safety guidelines to prevent eye injury:

- Do not look into unterminated ports or at fibers that connect to unknown sources.
- Do not examine unterminated optical ports with optical instruments.
- Avoid direct exposure to the beam.



.....  
**WARNING:** Unterminated optical connectors can emit invisible laser radiation. The lens in the human eye focuses all the laser power on the retina, so focusing the eye directly on a laser source—even a low-power laser—could permanently damage the eye.  
.....

### Class 1 Laser Product Warning



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**WARNING:** Class 1 laser product.  
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Waarschuwing Klasse-1 laser produkt.

Varoitus Luokan 1 lasertuote.

Attention Produit laser de classe I.

Warnung Laserprodukt der Klasse 1.



WARNING: **Avvertenza** Prodotto laser di Classe 1.

Advarsel Laserprodukt av klasse 1.

Aviso Produto laser de classe 1.

¡Atención! Producto láser Clase I.

Varning! Laserprodukt av klass 1.

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### Class 1 LED Product Warning



WARNING: Class 1 LED product.

Waarschuwing Klasse 1 LED-product.

Varoitus Luokan 1 valodiodituote.

Attention Alarme de produit LED Class I.

Warnung Class 1 LED-Produktwarnung.



WARNING: **Avvertenza** Avvertenza prodotto LED di Classe 1.

Advarsel LED-produkt i klasse 1.

Aviso Produto de classe 1 com LED.

¡Atención! Aviso sobre producto LED de Clase 1.

Varning! Lysdiodprodukt av klass 1.

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### Laser Beam Warning



WARNING: Do not stare into the laser beam or view it directly with optical instruments.

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WARNING: **Waarschuwing** Niet in de straal staren of hem rechtstreeks bekijken met optische instrumenten.



WARNING: **Varoitus** Älä katso säteeseen äläkä tarkastele sitä suoraan optisen laitteen avulla.



WARNING: **Attention** Ne pas fixer le faisceau des yeux, ni l'observer directement à l'aide d'instruments optiques.



WARNING: **Warnung** Nicht direkt in den Strahl blicken und ihn nicht direkt mit optischen Geräten prüfen.



WARNING: **Avvertenza** Non fissare il raggio con gli occhi né usare strumenti ottici per osservarlo direttamente.



WARNING: **Advarsel** Stirr eller se ikke direkte p strlen med optiske instrumenter.



WARNING: **Aviso** Não olhe fixamente para o raio, nem olhe para ele directamente com instrumentos ópticos.



WARNING: **¡Atención!** No mirar fijamente el haz ni observarlo directamente con instrumentos ópticos.



WARNING: **Varning!** Rikta inte blicken in mot strålen och titta inte direkt på den genom optiska instrument.

#### Related Topics

- General Safety Guidelines and Warnings for EX Series Switches on page 263
- Radiation from Open Port Apertures Warning for EX Series Switches on page 272
- Installation Instructions Warning for EX Series Switches on page 275
- Grounded Equipment Warning for EX Series Switches on page 282
- Optical Interface Support in EX2200 Switches
- Optical Interface Support in EX3200 and EX4200 Switches
- Optical Interface Support in EX4500 Switches





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WARNING: ¡Atención! Debido a que la apertura del puerto puede emitir radiación invisible cuando no existe un cable de fibra conectado, evite mirar directamente a las aperturas para no exponerse a la radiación.

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WARNING: **Varning!** Osynlig strålning kan avges från en portöppning utan ansluten fiberkabel och du bör därför undvika att bli utsatt för strålning genom att inte stirra in i oskyddade öppningar.

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#### Related Topics

- General Safety Guidelines and Warnings for EX Series Switches on page 263
- Laser and LED Safety Guidelines and Warnings for EX Series Switches on page 269
- Installation Instructions Warning for EX Series Switches on page 275
- Grounded Equipment Warning for EX Series Switches on page 282





# Installation and Maintenance Safety Information

- Installation Instructions Warning for EX Series Switches on page 275
- Chassis Lifting Guidelines for EX8200 Switches on page 276
- Ramp Warning for EX Series Switches on page 277
- Rack-Mounting and Cabinet-Mounting Warnings for EX Series Switches on page 278
- Grounded Equipment Warning for EX Series Switches on page 282
- Maintenance and Operational Safety Guidelines and Warnings for EX Series Switches on page 282

## Installation Instructions Warning for EX Series Switches

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**WARNING:** Read the installation instructions before you connect the switch to a power source.

**Waarschuwing** Raadpleeg de installatie-aanwijzingen voordat u het systeem met de voeding verbindt.

**Varoitus** Lue asennusohjeet ennen järjestelmän yhdistämistä virtalähteeseen.

**Attention** Avant de brancher le système sur la source d'alimentation, consulter les directives d'installation.

**Warnung** Lesen Sie die Installationsanweisungen, bevor Sie das System an die Stromquelle anschließen.

**Avvertenza** Consultare le istruzioni di installazione prima di collegare il sistema all'alimentatore.

**Advarsel** Les installasjonsinstruksjonene før systemet kobles til strømkilden.

**Aviso** Leia as instruções de instalação antes de ligar o sistema à sua fonte de energia.

**¡Atención!** Ver las instrucciones de instalación antes de conectar el sistema a la red de alimentación.

**Varning!** Läs installationsanvisningarna innan du kopplar systemet till dess strömförsörjningsenhet.

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**Related Topics**

- General Safety Guidelines and Warnings for EX Series Switches on page 263
- Laser and LED Safety Guidelines and Warnings for EX Series Switches on page 269
- Grounded Equipment Warning for EX Series Switches on page 282
- Connecting AC Power to an EX2200 Switch
- Connecting AC Power to an EX3200 or EX4200 Switch
- Connecting AC Power to an EX4500 Switch
- Connecting AC Power to an EX8200 Switch on page 173
- Connecting DC Power to an EX3200 or EX4200 Switch
- Connecting DC Power to an EX8200 Switch on page 175

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## Chassis Lifting Guidelines for EX8200 Switches

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The weight of a fully loaded EX8208 switch is approximately 284 lb (130 kg) and the weight of a fully loaded EX8216 switch is approximately 486 lb (220 kg). Observe the following guidelines for lifting and moving the switch:

- Before moving the switch to a site, ensure that the site meets the power, environmental, and clearance requirements specified in the “Site Preparation Checklist for an EX8200 Switch” on page 91.
- Do not attempt to lift the EX8208 switch by yourself. We recommend using a mechanical lift to install the EX8208 switch in a rack or cabinet. If you cannot use a lift, you must remove all components from the chassis before lifting and use a minimum of three people to lift the EX8208 switch chassis. For lifting and component removal instructions, see “Mounting an EX8208 Switch on a Rack or Cabinet Without Using a Mechanical Lift” on page 143.



**WARNING:** Because of the EX8216 switch's size and weight, we require the use of a mechanical lift to install the EX8216 switch in a rack or cabinet or to move the switch from one location to another.

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**CAUTION:** The EX8208 switch chassis has two handles, one on each side of the chassis. Do not lift a fully loaded chassis by the handles; make sure the chassis is empty before you lift it. If two of the people lifting the chassis use the handles to lift it, a third person must lift from the rear of the chassis. The rear of the chassis is heavier than the front of the chassis, so when you lift the chassis by the handles the chassis tips toward the

heavier back end. The person lifting from the back must be aware of this behavior and be braced to prevent the chassis from tipping over.

- Before lifting or moving the switch, disconnect all external cables and wires.
- Do not grasp the switch by the blue panel at the top front of the chassis. Doing so can cause the panel to detach from the switch.
- If you are lifting the EX8208 switch, as when lifting any heavy object, ensure that most of the weight is borne by your legs rather than your back. Keep your knees bent and your back relatively straight. Do not twist your body as you lift. Balance the load evenly among the people lifting the switch and be sure that your footing is firm.

- Related Topics**
- General Safety Guidelines and Warnings for EX Series Switches on page 263
  - Installation Instructions Warning for EX Series Switches on page 275
  - Mounting an EX8208 Switch on a Rack or Cabinet on page 138
  - Mounting an EX8216 Switch on a Rack or Cabinet

## Ramp Warning for EX Series Switches



**WARNING:** When installing the switch, do not use a ramp inclined at more than 10 degrees.

**Waarschuwing** Gebruik een oprijplaat niet onder een hoek van meer dan 10 graden.

**Varoitus** Älä käytä sellaista kaltevaa pintaa, jonka kaltevuus ylittää 10 astetta.

**Attention** Ne pas utiliser une rampe dont l'inclinaison est supérieure à 10 degrés.

**Warnung** Keine Rampen mit einer Neigung von mehr als 10 Grad verwenden.

**Avvertenza** Non usare una rampa con pendenza superiore a 10 gradi.

**Advarsel** Bruk aldri en rampe som heller mer enn 10 grader.

**Aviso** Não utilize uma rampa com uma inclinação superior a 10 graus.

**¡Atención!** No usar una rampa inclinada más de 10 grados

**Warning!** Använd inte ramp med en lutning på mer än 10 grader.

- Related Topics**
- General Safety Guidelines and Warnings for EX Series Switches on page 263
  - Laser and LED Safety Guidelines and Warnings for EX Series Switches on page 269
  - Installation Instructions Warning for EX Series Switches on page 275
  - Grounded Equipment Warning for EX Series Switches on page 282

## Rack-Mounting and Cabinet-Mounting Warnings for EX Series Switches

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Ensure that the rack or cabinet in which the EX Series switch is installed is evenly and securely supported. Uneven mechanical loading could lead to a hazardous condition.



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WARNING: To prevent bodily injury when mounting or servicing the switch in a rack, take the following precautions to ensure that the system remains stable. The following directives help maintain your safety:

- The switch must be installed in a rack that is secured to the building structure.
- The switch should be mounted at the bottom of the rack if it is the only unit in the rack.
- When mounting the switch on a partially filled rack, load the rack from the bottom to the top with the heaviest component at the bottom of the rack.
- If the rack is provided with stabilizing devices, install the stabilizers before mounting or servicing the switch in the rack.



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WARNING: **Waarschuwing** Om lichamelijk letsel te voorkomen wanneer u dit toestel in een rek monteert of het daar een servicebeurt geeft, moet u speciale voorzorgsmaatregelen nemen om ervoor te zorgen dat het toestel stabiel blijft. De onderstaande richtlijnen worden verstrekt om uw veiligheid te verzekeren:

- De Juniper Networks switch moet in een stellage worden geïnstalleerd die aan een bouwsel is verankerd.
- Dit toestel dient onderaan in het rek gemonteerd te worden als het toestel het enige in het rek is.
- Wanneer u dit toestel in een gedeeltelijk gevuld rek monteert, dient u het rek van onderen naar boven te laden met het zwaarste onderdeel onderaan in het rek.
- Als het rek voorzien is van stabiliseringshulpmiddelen, dient u de stabilisatoren te monteren voordat u het toestel in het rek monteert of het daar een servicebeurt geeft.



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WARNING: **Varoitus** Kun laite asetetaan telineeseen tai huolletaan sen ollessa telineessä, on noudatettava erityisiä varotoimia järjestelmän vakavuuden säilyttämiseksi, jotta vältetään loukkaantumiset. Noudata seuraavia turvallisuusohjeita:

- Juniper Networks switch on asennettava telineeseen, joka on kiinnitetty rakennukseen.
- Jos telineessä ei ole muita laitteita, aseta laite telineen alaosaan.

- Jos laite asetetaan osaksi täytettyyn telineeseen, aloita kuormittaminen sen alaosasta kaikkein raskaimmalla esineellä ja siirry sitten sen yläosaan.
- Jos telinettä varten on vakaimet, asenna ne ennen laitteen asettamista telineeseen tai sen huoltamista siinä.



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 .....  
 WARNING: **Attention** Pour éviter toute blessure corporelle pendant les opérations de montage ou de réparation de cette unité en casier, il convient de prendre des précautions spéciales afin de maintenir la stabilité du système. Les directives ci-dessous sont destinées à assurer la protection du personnel:

- Le rack sur lequel est monté le Juniper Networks switch doit être fixé à la structure du bâtiment.
- Si cette unité constitue la seule unité montée en casier, elle doit être placée dans le bas.
- Si cette unité est montée dans un casier partiellement rempli, charger le casier de bas en haut en plaçant l'élément le plus lourd dans le bas.
- Si le casier est équipé de dispositifs stabilisateurs, installer les stabilisateurs avant de monter ou de réparer l'unité en casier.



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 .....  
 WARNING: **Warnung** Zur Vermeidung von Körperverletzung beim Anbringen oder Warten dieser Einheit in einem Gestell müssen Sie besondere Vorkehrungen treffen, um sicherzustellen, daß das System stabil bleibt. Die folgenden Richtlinien sollen zur Gewährleistung Ihrer Sicherheit dienen:

- Der Juniper Networks switch muß in einem Gestell installiert werden, das in der Gebäudestruktur verankert ist.
- Wenn diese Einheit die einzige im Gestell ist, sollte sie unten im Gestell angebracht werden.
- Bei Anbringung dieser Einheit in einem zum Teil gefüllten Gestell ist das Gestell von unten nach oben zu laden, wobei das schwerste Bauteil unten im Gestell anzubringen ist.
- Wird das Gestell mit Stabilisierungszubehör geliefert, sind zuerst die Stabilisatoren zu installieren, bevor Sie die Einheit im Gestell anbringen oder sie warten.



.....  
 .....  
 WARNING: **Avvertenza** Per evitare infortuni fisici durante il montaggio o la manutenzione di questa unità in un supporto, occorre osservare speciali precauzioni per garantire che

il sistema rimanga stabile. Le seguenti direttive vengono fornite per garantire la sicurezza personale:

- Il Juniper Networks switch deve essere installato in un telaio, il quale deve essere fissato alla struttura dell'edificio.
- Questa unità deve venire montata sul fondo del supporto, se si tratta dell'unica unità da montare nel supporto.
- Quando questa unità viene montata in un supporto parzialmente pieno, caricare il supporto dal basso all'alto, con il componente più pesante sistemato sul fondo del supporto.
- Se il supporto è dotato di dispositivi stabilizzanti, installare tali dispositivi prima di montare o di procedere alla manutenzione dell'unità nel supporto.



**WARNING: Advarsel** Unngå fysiske skader under montering eller reparasjonsarbeid på denne enheten når den befinner seg i et kabinett. Vær nøye med at systemet er stabilt. Følgende retningslinjer er gitt for å verne om sikkerheten:

- Juniper Networks switch må installeres i et stativ som er forankret til bygningsstrukturen.
- Denne enheten bør monteres nederst i kabinettet hvis dette er den eneste enheten i kabinettet.
- Ved montering av denne enheten i et kabinett som er delvis fylt, skal kabinettet lastes fra bunnen og opp med den tyngste komponenten nederst i kabinettet.
- Hvis kabinettet er utstyrt med stabiliseringsutstyr, skal stabilisatorene installeres før montering eller utføring av reparasjonsarbeid på enheten i kabinettet.



**WARNING: Aviso** Para se prevenir contra danos corporais ao montar ou reparar esta unidade numa estante, deverá tomar precauções especiais para se certificar de que o sistema possui um suporte estável. As seguintes directrizes ajudá-lo-ão a efectuar o seu trabalho com segurança:

- O Juniper Networks switch deverá ser instalado numa prateleira fixa à estrutura do edifício.
  - Esta unidade deverá ser montada na parte inferior da estante, caso seja esta a única unidade a ser montada.
  - Ao montar esta unidade numa estante parcialmente ocupada, coloque os itens mais pesados na parte inferior da estante, arrumando-os de baixo para cima.
  - Se a estante possuir um dispositivo de estabilização, instale-o antes de montar ou reparar a unidade.
-



WARNING: **¡Atención!** Para evitar lesiones durante el montaje de este equipo sobre un bastidor, o posteriormente durante su mantenimiento, se debe poner mucho cuidado en que el sistema quede bien estable. Para garantizar su seguridad, proceda según las siguientes instrucciones:

- El Juniper Networks switch debe instalarse en un bastidor fijado a la estructura del edificio.
- Colocar el equipo en la parte inferior del bastidor, cuando sea la única unidad en el mismo.
- Cuando este equipo se vaya a instalar en un bastidor parcialmente ocupado, comenzar la instalación desde la parte inferior hacia la superior colocando el equipo más pesado en la parte inferior.
- Si el bastidor dispone de dispositivos estabilizadores, instalar éstos antes de montar o proceder al mantenimiento del equipo instalado en el bastidor.



WARNING: **Varning!** För att undvika kroppsskada när du installerar eller utför underhållsarbete på denna enhet på en ställning måste du vidta särskilda försiktighetsåtgärder för att försäkra dig om att systemet står stadigt. Följande riktlinjer ges för att trygga din säkerhet:

- Juniper Networks switch måste installeras i en ställning som är förankrad i byggnadens struktur.
- Om denna enhet är den enda enheten på ställningen skall den installeras längst ned på ställningen.
- Om denna enhet installeras på en delvis fylld ställning skall ställningen fyllas nedifrån och upp, med de tyngsta enheterna längst ned på ställningen.
- Om ställningen är försedd med stabiliseringsdon skall dessa monteras fast innan enheten installeras eller underhålls på ställningen.

#### Related Topics

- General Safety Guidelines and Warnings for EX Series Switches on page 263
- Installation Instructions Warning for EX Series Switches on page 275
- Grounded Equipment Warning for EX Series Switches on page 282
- Mounting an EX2200 Switch
- Mounting an EX3200 or EX4200 Switch
- Mounting an EX4500 Switch
- Mounting an EX8208 Switch on a Rack or Cabinet on page 138
- Mounting an EX8216 Switch on a Rack or Cabinet

## Grounded Equipment Warning for EX Series Switches

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**WARNING:** The switch is intended to be grounded. During normal use, ensure that you have connected earth ground to the switch chassis.

**Waarschuwing** Deze apparatuur hoort geaard te worden. Zorg dat de host-computer tijdens normaal gebruik met aarde is verbonden.

**Varoitus** Tämä laitteisto on tarkoitettu maadoitettavaksi. Varmista, että isäntälaitte on yhdistetty maahan normaalikäytön aikana.

**Attention** Cet équipement doit être relié à la terre. S'assurer que l'appareil hôte est relié à la terre lors de l'utilisation normale.

**Warnung** Dieses Gerät muß geerdet werden. Stellen Sie sicher, daß das Host-Gerät während des normalen Betriebs an Erde gelegt ist.

**Avvertenza** Questa apparecchiatura deve essere collegata a massa. Accertarsi che il dispositivo host sia collegato alla massa di terra durante il normale utilizzo.

**Advarsel** Dette utstyret skal jordes. Forviss deg om vertsterminalen er jordet ved normalt bruk.

**Aviso** Este equipamento deverá estar ligado à terra. Certifique-se que o host se encontra ligado à terra durante a sua utilização normal.

**¡Atención!** Este equipo debe conectarse a tierra. Asegurarse de que el equipo principal esté conectado a tierra durante el uso normal.

**Varning!** Denna utrustning är avsedd att jordas. Se till att värdenheten är jordad vid normal användning.

- 
- Related Topics**
- General Safety Guidelines and Warnings for EX Series Switches on page 263
  - Connecting Earth Ground to an EX Series Switch on page 167

## Maintenance and Operational Safety Guidelines and Warnings for EX Series Switches

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While performing the maintenance activities for EX Series switches, observe the following guidelines and warnings:

- Battery Handling Warning on page 283
- Jewelry Removal Warning on page 284
- Lightning Activity Warning on page 285
- Operating Temperature Warning on page 286
- Product Disposal Warning on page 288



## Battery Handling Warning



WARNING: Replacing a battery incorrectly might result in an explosion. Replace a battery only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.



WARNING: **Waarschuwing** Er is ontploffingsgevaar als de batterij verkeerd vervangen wordt. Vervang de batterij slechts met hetzelfde of een equivalent type dat door de fabrikant aanbevolen is. Gebruikte batterijen dienen overeenkomstig fabrieksvoorschriften weggeworpen te worden.



WARNING: **Varoitus** Räjähdyksen vaara, jos akku on vaihdettu väärään akkuun. Käytä vaihtamiseen ainoastaan saman- tai vastaaventyypistä akkua, joka on valmistajan suosittelema. Hävitä käytetyt akut valmistajan ohjeiden mukaan.



WARNING: **Attention** Danger d'explosion si la pile n'est pas remplacée correctement. Ne la remplacer que par une pile de type semblable ou équivalent, recommandée par le fabricant. Jeter les piles usagées conformément aux instructions du fabricant.



WARNING: **Warnung** Bei Einsetzen einer falschen Batterie besteht Explosionsgefahr. Ersetzen Sie die Batterie nur durch den gleichen oder vom Hersteller empfohlenen Batterietyp. Entsorgen Sie die benutzten Batterien nach den Anweisungen des Herstellers.



WARNING: **Advarsel** Det kan være fare for eksplosjon hvis batteriet skiftes på feil måte. Skift kun med samme eller tilsvarende type som er anbefalt av produsenten. Kasser brukte batterier i henhold til produsentens instruksjoner.



WARNING: **Avvertenza** Pericolo di esplosione se la batteria non è installata correttamente. Sostituire solo con una di tipo uguale o equivalente, consigliata dal produttore. Eliminare le batterie usate secondo le istruzioni del produttore.



WARNING: **Aviso** Existe perigo de explosão se a bateria for substituída incorrectamente. Substitua a bateria por uma bateria igual ou de um tipo equivalente recomendado pelo fabricante. Destrua as baterias usadas conforme as instruções do fabricante.



.....  
WARNING: ¡Atención! Existe peligro de explosión si la batería se reemplaza de manera incorrecta. Reemplazar la batería exclusivamente con el mismo tipo o el equivalente recomendado por el fabricante. Desechar las baterías gastadas según las instrucciones del fabricante.  
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.....  
WARNING: **Varning!** Explosionsfara vid felaktigt batteribyte. Ersätt endast batteriet med samma batterityp som rekommenderas av tillverkaren eller motsvarande. Följ tillverkarens anvisningar vid kassering av använda batterier.  
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### Jewelry Removal Warning



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WARNING: Before working on equipment that is connected to power lines, remove jewelry, including rings, necklaces, and watches. Metal objects heat up when connected to power and ground and can cause serious burns or can be welded to the terminals.  
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.....  
WARNING: **Waarschuwing** Alvorens aan apparatuur te werken die met elektrische leidingen is verbonden, sieraden (inclusief ringen, kettingen en horloges) verwijderen. Metalen voorwerpen worden warm wanneer ze met stroom en aarde zijn verbonden, en kunnen ernstige brandwonden veroorzaken of het metalen voorwerp aan de aansluitklemmen lassen.  
.....



.....  
WARNING: **Varoitus** Ennen kuin työskentelet voimavirtajohtoihin kytkettyjen laitteiden parissa, ota pois kaikki korut (sormukset, kaulakorut ja kellot mukaan lukien). Metalliesineet kuumenevat, kun ne ovat yhteydessä sähkövirran ja maan kanssa, ja ne voivat aiheuttaa vakavia palovammoja tai hitsata metalliesineet kiinni liitäntänapoihin.  
.....



.....  
WARNING: **Attention** Avant d'accéder à cet équipement connecté aux lignes électriques, ôter tout bijou (anneaux, colliers et montres compris). Lorsqu'ils sont branchés à l'alimentation et reliés à la terre, les objets métalliques chauffent, ce qui peut provoquer des blessures graves ou souder l'objet métallique aux bornes.  
.....



.....  
WARNING: **Warnung** Vor der Arbeit an Geräten, die an das Netz angeschlossen sind, jeglichen Schmuck (einschließlich Ringe, Ketten und Uhren) abnehmen. Metallgegenstände erhitzen sich, wenn sie an das Netz und die Erde angeschlossen werden, und können schwere Verbrennungen verursachen oder an die Anschlußklemmen angeschweißt werden.  
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.....  
 WARNING: **Avvertenza** Prima di intervenire su apparecchiature collegate alle linee di alimentazione, togliersi qualsiasi monile (inclusi anelli, collane, braccialetti ed orologi). Gli oggetti metallici si riscaldano quando sono collegati tra punti di alimentazione e massa: possono causare ustioni gravi oppure il metallo può saldarsi ai terminali.  
 .....



.....  
 WARNING: **Advarsel** Fjern alle smykker (inkludert ringe, halskjeder og klokker) før du skal arbeide på utstyr som er koblet til kraftledninger. Metallgjenstander som er koblet til kraftledninger og jord blir svært varme og kan forårsake alvorlige brannskader eller smelte fast til polene.  
 .....



.....  
 WARNING: **Aviso** Antes de trabalhar em equipamento que esteja ligado a linhas de corrente, retire todas as jóias que estiver a usar (incluindo anéis, fios e relógios). Os objectos metálicos aquecerão em contacto com a corrente e em contacto com a ligação à terra, podendo causar queimaduras graves ou ficarem soldados aos terminais.  
 .....



.....  
 WARNING: **¡Atención!** Antes de operar sobre equipos conectados a líneas de alimentación, quitarse las joyas (incluidos anillos, collares y relojes). Los objetos de metal se calientan cuando se conectan a la alimentación y a tierra, lo que puede ocasionar quemaduras graves o que los objetos metálicos queden soldados a los bornes.  
 .....



.....  
 WARNING: **Varning!** Tag av alla smycken (inklusive ringar, halsband och armbandsur) innan du arbetar på utrustning som är kopplad till kraftledningar. Metallobjekt hettas upp när de kopplas ihop med ström och jord och kan förorsaka allvarliga brännskador; metallobjekt kan också sammansvetsas med kontakterna.  
 .....

### Lightning Activity Warning



.....  
 WARNING: Do not work on the system or connect or disconnect cables during periods of lightning activity.  
 .....



.....  
 WARNING: **Waarschuwing** Tijdens onweer dat gepaard gaat met bliksem, dient u niet aan het systeem te werken of kabels aan te sluiten of te ontkoppelen.  
 .....



.....  
 WARNING: **Varoitus** Älä työskentele järjestelmän parissa äläkä yhdistä tai irrota kaapeleita ukkosilmalla.  
 .....



.....  
WARNING: **Attention** Ne pas travailler sur le système ni brancher ou débrancher les câbles pendant un orage.  
.....



.....  
WARNING: **Warnung** Arbeiten Sie nicht am System und schließen Sie keine Kabel an bzw. trennen Sie keine ab, wenn es gewittert.  
.....



.....  
WARNING: **Avvertenza** Non lavorare sul sistema o collegare oppure scollegare i cavi durante un temporale con fulmini.  
.....



.....  
WARNING: **Advarsel** Utfør aldri arbeid på systemet, eller koble kabler til eller fra systemet når det tordner eller lyner.  
.....



.....  
WARNING: **Aviso** Não trabalhe no sistema ou ligue e desligue cabos durante períodos de mau tempo (trovoada).  
.....



.....  
WARNING: **¡Atención!** No operar el sistema ni conectar o desconectar cables durante el transcurso de descargas eléctricas en la atmósfera.  
.....



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WARNING: **Varning!** Vid åska skall du aldrig utföra arbete på systemet eller ansluta eller koppla loss kablar.  
.....

### Operating Temperature Warning



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WARNING: To prevent the switch from overheating, do not operate it in an area that exceeds the maximum recommended ambient temperature of 104° F (40° C). To prevent airflow restriction, allow at least 6 in. (15.2 cm) of clearance around the ventilation openings.  
.....



.....  
WARNING: **Waarschuwing** Om te voorkomen dat welke switch van de Juniper Networks router dan ook oververhit raakt, dient u deze niet te bedienen op een plaats waar de maximale aanbevolen omgevingstemperatuur van 40° C wordt overschreden. Om te voorkomen dat de luchtstroom wordt beperkt, dient er minstens 15,2 cm speling rond de ventilatie-openingen te zijn.  
.....



WARNING: **Varoitus** Ettei Juniper Networks switch-sarjan reititin ylikuumentuisi, sitä ei saa käyttää tilassa, jonka lämpötila ylittää korkeimman suositellun ympäristölämpötilan 40° C. Ettei ilmanvaihto estyisi, tuuletusaukkojen ympärille on jätettävä ainakin 15,2 cm tilaa.



WARNING: **Attention** Pour éviter toute surchauffe des routeurs de la gamme Juniper Networks switch, ne l'utilisez pas dans une zone où la température ambiante est supérieure à 40° C. Pour permettre un flot d'air constant, dégagez un espace d'au moins 15,2 cm autour des ouvertures de ventilations.



WARNING: **Warnung** Um einen Router der switch vor Überhitzung zu schützen, darf dieser nicht in einer Gegend betrieben werden, in der die Umgebungstemperatur das empfohlene Maximum von 40° C überschreitet. Um Lüftungsverschluß zu verhindern, achten Sie darauf, daß mindestens 15,2 cm lichter Raum um die Lüftungsöffnungen herum frei bleibt.



WARNING: **Avvertenza** Per evitare il surriscaldamento dei switch, non adoperateli in un locale che ecceda la temperatura ambientale massima di 40° C. Per evitare che la circolazione dell'aria sia impedita, lasciate uno spazio di almeno 15.2 cm di fronte alle aperture delle ventole.



WARNING: **Advarsel** Unngå overoppheting av eventuelle rutere i Juniper Networks switch Disse skal ikke brukes på steder der den anbefalte maksimale omgivelsestemperaturen overstiger 40° C (104° F). Sørg for at klaringen rundt lufteåpningene er minst 15,2 cm (6 tommer) for å forhindre nedsatt luftsirkulasjon.



WARNING: **Aviso** Para evitar o sobreaquecimento do encaminhador Juniper Networks switch, não utilize este equipamento numa área que exceda a temperatura máxima recomendada de 40° C. Para evitar a restrição à circulação de ar, deixe pelo menos um espaço de 15,2 cm à volta das aberturas de ventilação.



WARNING: **¡Atención!** Para impedir que un encaminhador de la serie Juniper Networks switch se recaliente, no lo haga funcionar en un área en la que se supere la temperatura ambiente máxima recomendada de 40° C. Para impedir la restricción de la entrada de aire, deje un espacio mínimo de 15,2 cm alrededor de las aperturas para ventilación.





.....  
**WARNING: Varning! Slutlig kassering av denna produkt bör skötas i enlighet med landets alla lagar och föreskrifter.**  
.....

**Related Topics**

- General Safety Guidelines and Warnings for EX Series Switches on page 263
- General Electrical Safety Guidelines and Warnings for EX Series Switches on page 291
- AC Power Electrical Safety Guidelines for EX Series Switches on page 294
- DC Power Electrical Safety Guidelines for EX Series Switches on page 296
- Laser and LED Safety Guidelines and Warnings for EX Series Switches on page 269
- Installation Instructions Warning for EX Series Switches on page 275
- Grounded Equipment Warning for EX Series Switches on page 282





# Power and Electrical Safety Information

- General Electrical Safety Guidelines and Warnings for EX Series Switches on page 291
- Prevention of Electrostatic Discharge Damage on EX Series Switches on page 292
- AC Power Electrical Safety Guidelines for EX Series Switches on page 294
- AC Power Disconnection Warning for EX Series Switches on page 295
- DC Power Electrical Safety Guidelines for EX Series Switches on page 296
- DC Power Disconnection Warning for EX Series Switches on page 297
- DC Power Grounding Requirements and Warning for EX Series Switches on page 298
- DC Power Wiring Sequence Warning for EX Series Switches on page 299
- DC Power Wiring Terminations Warning for EX Series Switches on page 301
- Multiple Power Supplies Disconnection Warning for EX Series Switches on page 302
- TN Power Warning for EX Series Switches on page 302
- In Case of Electrical Accident: Action to Take on an EX Series Switch on page 303

## General Electrical Safety Guidelines and Warnings for EX Series Switches

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**WARNING:** Certain ports on the switch are designed for use as intrabuilding (within-the-building) interfaces only (Type 2 or Type 4 ports as described in GR-1089-CORE, Issue 4) and require isolation from the exposed outside plant (OSP) cabling. To comply with NEBS requirements and protect against lightning surges and commercial power disturbances, the intrabuilding ports *must not* be metallically connected to interfaces that connect to the OSP or its wiring. The intrabuilding ports on the switch are suitable for connection to intrabuilding or unexposed wiring or cabling only. The addition of primary protectors is not sufficient protection for connecting these interfaces metallically to OSP wiring.

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**CAUTION:** Before removing or installing components of a switch, attach an ESD strap to an ESD point and place the other end of the strap around your bare wrist. Failure to use an ESD strap could result in damage to the switch.

.....

- Install the EX Series switch in compliance with the following local, national, and international electrical codes:
  - United States—National Fire Protection Association (NFPA 70), United States National Electrical Code.
  - Other countries—International Electromechanical Commission (IEC) 60364, Part 1 through Part 7.
  - Evaluated to the TN power system.
  - Canada—Canadian Electrical Code, Part 1, CSA C22.1.
- Locate the emergency power-off switch for the room in which you are working so that if an electrical accident occurs, you can quickly turn off the power.
- Make sure that grounding surfaces are cleaned and brought to a bright finish before grounding connections are made.
- Do not work alone if potentially hazardous conditions exist anywhere in your workspace.
- Never assume that power is disconnected from a circuit. Always check the circuit before starting to work.
- Carefully look for possible hazards in your work area, such as moist floors, ungrounded power extension cords, and missing safety grounds.
- Operate the EX Series switch within marked electrical ratings and product usage instructions.
- To ensure that the EX Series switch and peripheral equipment function safely and correctly, use the cables and connectors specified for the attached peripheral equipment, and make certain they are in good condition.

You can remove and replace many switch components without powering off or disconnecting power to the switch, as detailed elsewhere in the hardware documentation for this product. Never install equipment if it appears damaged.

- Related Topics**
- General Safety Guidelines and Warnings for EX Series Switches on page 263
  - AC Power Electrical Safety Guidelines for EX Series Switches on page 294
  - DC Power Electrical Safety Guidelines for EX Series Switches on page 296

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## Prevention of Electrostatic Discharge Damage on EX Series Switches

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Switch components that are shipped in antistatic bags are sensitive to damage from static electricity. Some components can be impaired by voltages as low as 30 V. You can easily generate potentially damaging static voltages whenever you handle plastic or foam packing material or if you move components across plastic or carpets. Observe the following guidelines to minimize the potential for electrostatic discharge (ESD) damage, which can cause intermittent or complete component failures:

- Always use an ESD grounding strap when you are handling components that are subject to ESD damage, and make sure that it is in direct contact with your skin.

If a grounding strap is not available, hold the component in its antistatic bag (see Figure 113 on page 293) in one hand and touch the exposed, bare metal of the switch with the other hand immediately before inserting the component into the switch.



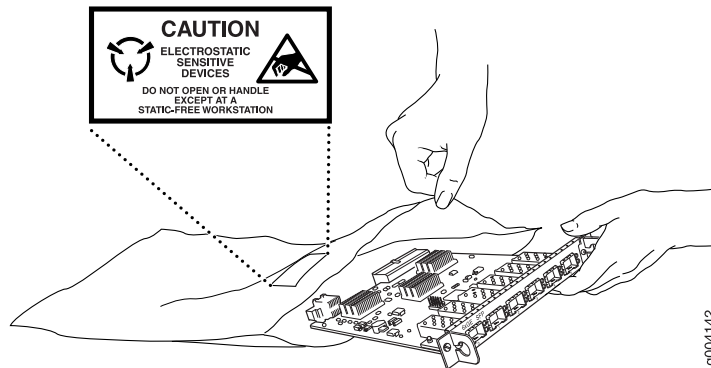
**WARNING:** For safety, periodically check the resistance value of the ESD strap. The measurement must be in the range of 1 through 10 Mohms.

- When handling any component that is subject to ESD damage and that is removed from the chassis, make sure the equipment end of your ESD strap is attached to the ESD point on the chassis.

If no grounding strap is available, touch the exposed, bare metal of the switch to ground yourself before handling the component.

- Avoid contact between the component that is subject to ESD damage and your clothing. ESD voltages emitted from clothing can damage components.
- When removing or installing a component that is subject to ESD damage, always place it component-side up on an antistatic surface, in an antistatic card rack, or in an antistatic bag (see Figure 113 on page 293). If you are returning a component, place it in an antistatic bag before packing it.

**Figure 113: Place a Component into an Antistatic Bag**



**CAUTION:** ANSI/TIA/EIA-568 cables such as category 5e and category 6 can get electrostatically charged. In order to dissipate this charge, always ground the cables to a suitable and safe earth ground before connecting them to the system.

#### Related Topics

- General Safety Guidelines and Warnings for EX Series Switches on page 263
- See Rear Panel of an EX2200 Switch for the ESD point location.
- See Rear Panel of an EX3200 Switch for the ESD point location.
- See Rear Panel of an EX4200 Switch for the ESD point location.
- See Front Panel of an EX4500 Switch for the ESD point location.

- See Chassis Physical Specifications of an EX8208 Switch on page 9 for the ESD point location.
- See Chassis Physical Specifications of an EX8216 Switch for the ESD point location.

## AC Power Electrical Safety Guidelines for EX Series Switches



**CAUTION:** For switches with AC power supplies, an external surge protective device (SPD) must be used at the AC power source.

The following electrical safety guidelines apply to AC-powered switches:

- Note the following warnings printed on the chassis:
  - “**CAUTION:** THIS UNIT HAS MORE THAN ONE POWER SUPPLY CORD. DISCONNECT ALL POWER SUPPLY CORDS BEFORE SERVICING TO AVOID ELECTRIC SHOCK.”
  - “**ATTENTION:** CET APPAREIL COMPORTE PLUS D'UN CORDON D'ALIMENTATION. AFIN DE PRÉVENIR LES CHOCS ÉLECTRIQUES, DÉBRANCHER TOUT CORDON D'ALIMENTATION AVANT DE FAIRE LE DÉPANNAGE.”
- AC-powered switches are shipped with a three-wire electrical cord with a grounding-type plug that fits only a grounding-type power outlet. Do not circumvent this safety feature. Equipment grounding must comply with local and national electrical codes.
- You must provide an external certified circuit breaker rated minimum 20 A in the building installation.
- The power cord serves as the main disconnecting device for the switch. The socket outlet must be near the switch and be easily accessible.
- For EX Series switches that have more than one power supply connection, you must ensure that all power connections are fully disconnected so that power to the switch is completely removed to avoid electric shock. To disconnect power, unplug all power cords (one for each power supply).

### Power Cable Warning (Japanese)

WARNING: The attached power cable is only for this product. Do not use the cable for another product.

**注意**

**附属の電源コードセットはこの製品専用です。  
他の電気機器には使用しないでください。**

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- Related Topics**
- General Safety Guidelines and Warnings for EX Series Switches on page 263
  - General Electrical Safety Guidelines and Warnings for EX Series Switches on page 291

- Multiple Power Supplies Disconnection Warning for EX Series Switches on page 302
- Connecting AC Power to an EX2200 Switch
- Connecting AC Power to an EX3200 or EX4200 Switch
- Connecting AC Power to an EX4500 Switch
- Connecting AC Power to an EX8200 Switch on page 173

## AC Power Disconnection Warning for EX Series Switches



**WARNING:** Before working on the switch or near power supplies, unplug all the power cords from an AC switch.

**Waarschuwing** Voordat u aan een frame of in de nabijheid van voedingen werkt, dient u bij wisselstroom toestellen de stekker van het netsnoer uit het stopcontact te halen.

**Varoitus** Kytke irti vaihtovirtalaitteiden virtajohto, ennen kuin teet mitään asennuspohjalle tai työskentelet virtalähteiden läheisyydessä.

**Attention** Avant de travailler sur un châssis ou à proximité d'une alimentation électrique, débrancher le cordon d'alimentation des unités en courant alternatif.

**Warnung** Bevor Sie an einem Chassis oder in der Nähe von Netzgeräten arbeiten, ziehen Sie bei Wechselstromeinheiten das Netzkabel ab bzw.

**Avvertenza** Prima di lavorare su un telaio o intorno ad alimentatori, scollegare il cavo di alimentazione sulle unità CA.

**Advarsel** Før det utføres arbeid på kabinettet eller det arbeides i nærheten av strømforsyningsenheter, skal strømledningen trekkes ut på vekselstrømsenheter.

**Aviso** Antes de trabalhar num chassis, ou antes de trabalhar perto de unidades de fornecimento de energia, desligue o cabo de alimentação nas unidades de corrente alternada.

**¡Atención!** Antes de manipular el chasis de un equipo o trabajar cerca de una fuente de alimentación, desenchufar el cable de alimentación en los equipos de corriente alterna (CA).

**Varning!** Innan du arbetar med ett chassi eller nära strömförsörjningsenheter skall du för växelströmsenheter dra ur nätsladden.

### Related Topics

- General Safety Guidelines and Warnings for EX Series Switches on page 263
- General Electrical Safety Guidelines and Warnings for EX Series Switches on page 291
- AC Power Electrical Safety Guidelines for EX Series Switches on page 294

## DC Power Electrical Safety Guidelines for EX Series Switches

The following electrical safety guidelines apply to a DC-powered switch:

- A DC-powered switch is equipped with a DC terminal block that is rated for the power requirements of a maximally configured switch.



**NOTE:** To supply sufficient power, terminate the DC input wiring on a facility DC source capable of supplying at least 8 A at –48 VDC for EX3200 and EX4200 switches.

To supply sufficient power, terminate the DC input wiring on a facility DC source capable of supplying at least 60 A at –48 VDC for EX8208 switches.

To supply sufficient power, terminate the DC input wiring on a facility DC source capable of supplying at least 100 A at –48 VDC for EX8216 switches.

Incorporate an easily accessible disconnect device into the facility wiring. Be sure to connect the ground wire or conduit to a solid office earth ground. A closed loop ring is recommended for terminating the ground conductor at the ground stud.

- Run two wires from the circuit breaker box to a source of 48 VDC.
- A DC-powered router that is equipped with a DC terminal block is intended only for installation in a restricted access location. In the United States, a restricted access area is one in accordance with Articles 110-16, 110-17, and 110-18 of the National Electrical Code ANSI/NFPA 70.



**NOTE:** Primary overcurrent protection is provided by the building circuit breaker. This breaker must protect against excess currents, short circuits, and earth grounding faults in accordance with NEC ANSI/NFPA 70.

- Ensure that the polarity of the DC input wiring is correct. Under certain conditions, connections with reversed polarity might trip the primary circuit breaker or damage the equipment.
- For personal safety, connect the green and yellow wire to safety (earth) ground at both the switch and the supply side of the DC wiring.
- The marked input voltage of –48 VDC for a DC-powered switch is the nominal voltage associated with the battery circuit, and any higher voltages are only to be associated with float voltages for the charging function.
- Because the switch is a positive ground system, you must connect the positive lead to the terminal labeled RTN, the negative lead to the terminal labeled –48 VDC, and the earth ground to the chassis grounding points.

### Related Topics

- General Safety Guidelines and Warnings for EX Series Switches on page 263
- General Electrical Safety Guidelines and Warnings for EX Series Switches on page 291

- DC Power Disconnection Warning for EX Series Switches on page 297
- DC Power Grounding Requirements and Warning for EX Series Switches on page 298
- DC Power Wiring Sequence Warning for EX Series Switches on page 299
- DC Power Wiring Terminations Warning for EX Series Switches on page 301
- Connecting DC Power to an EX3200 or EX4200 Switch
- Connecting DC Power to an EX8200 Switch on page 175

## DC Power Disconnection Warning for EX Series Switches



**WARNING:** Before performing any of the DC power procedures, ensure that power is removed from the DC circuit. To ensure that all power is off, locate the circuit breaker on the panel board that services the DC circuit, switch the circuit breaker to the OFF position, and tape the switch handle of the circuit breaker in the OFF position.

**Waarschuwing** Voordat u een van de onderstaande procedures uitvoert, dient u te controleren of de stroom naar het gelijkstroom circuit uitgeschakeld is. Om u ervan te verzekeren dat alle stroom UIT is geschakeld, kiest u op het schakelbord de stroomverbreker die het gelijkstroom circuit bedient, draait de stroomverbreker naar de UIT positie en plakt de schakelaarhendel van de stroomverbreker met plakband in de UIT positie vast.

**Varoitus** Varmista, että tasavirtapiirissä ei ole virtaa ennen seuraavien toimenpiteiden suorittamista. Varmistaaksesi, että virta on KATKAISTU täysin, paikanna tasavirrasta huolehtivassa kojetaulussa sijaitseva suojakytkin, käännä suojakytkin KATKAISTU-asentoon ja teippaa suojakytkimen varsi niin, että se pysyy KATKAISTU-asennossa.

**Attention** Avant de pratiquer l'une quelconque des procédures ci-dessous, vérifiez que le circuit en courant continu n'est plus sous tension. Pour en être sûr, localiser le disjoncteur situé sur le panneau de service du circuit en courant continu, placer le disjoncteur en position fermée (OFF) et, à l'aide d'un ruban adhésif, bloquer la poignée du disjoncteur en position OFF.

**Warnung** Vor Ausführung der folgenden Vorgänge ist sicherzustellen, daß die Gleichstromschaltung keinen Strom erhält. Um sicherzustellen, daß sämtlicher Strom abgestellt ist, machen Sie auf der Schalttafel den Unterbrecher für die Gleichstromschaltung ausfindig, stellen Sie den Unterbrecher auf AUS, und kleben Sie den Schaltergriff des Unterbrechers mit Klebeband in der AUS-Stellung fest.

**Avvertenza** Prima di svolgere una qualsiasi delle procedure seguenti, verificare che il circuito CC non sia alimentato. Per verificare che tutta l'alimentazione sia scollegata (OFF), individuare l'interruttore automatico sul quadro strumenti che alimenta il circuito CC, mettere l'interruttore in posizione OFF e fissarlo con nastro adesivo in tale posizione.

**Advarsel** Før noen av disse prosedyrene utføres, kontroller at strømmen er frakoblet likestrømkretsen. Sørg for at all strøm er slått AV. Dette gjøres ved å lokalisere

strømbryteren på brytertavlen som betjener likestrømkretsen, slå strømbryteren AV og teipe bryterhåndtaket på strømbryteren i AV-stilling.

**Aviso** Antes de executar um dos seguintes procedimentos, certifique-se que desligou a fonte de alimentação de energia do circuito de corrente contínua. Para se assegurar que toda a corrente foi DESLIGADA, localize o disjuntor no painel que serve o circuito de corrente contínua e coloque-o na posição OFF (Desligado), segurando nessa posição a manivela do interruptor do disjuntor com fita isoladora.

**¡Atención!** Antes de proceder con los siguientes pasos, comprobar que la alimentación del circuito de corriente continua (CC) esté cortada (OFF). Para asegurarse de que toda la alimentación esté cortada (OFF), localizar el interruptor automático en el panel que alimenta al circuito de corriente continua, cambiar el interruptor automático a la posición de Apagado (OFF), y sujetar con cinta la palanca del interruptor automático en posición de Apagado (OFF).

**Varning!** Innan du utför någon av följande procedurer måste du kontrollera att strömförsörjningen till likströmskretsen är bruten. Kontrollera att all strömförsörjning är BRUTEN genom att slå AV det överspänningskydd som skyddar likströmskretsen och tejpa fast överspänningskyddets omkopplare i FRÅN-läget.

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**Related Topics**

- General Safety Guidelines and Warnings for EX Series Switches on page 263
- General Electrical Safety Guidelines and Warnings for EX Series Switches on page 291
- DC Power Electrical Safety Guidelines for EX Series Switches on page 296
- DC Power Grounding Requirements and Warning for EX Series Switches on page 298
- DC Power Wiring Sequence Warning for EX Series Switches on page 299
- DC Power Wiring Terminations Warning for EX Series Switches on page 301

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## DC Power Grounding Requirements and Warning for EX Series Switches

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An insulated grounding conductor that is identical in size to the grounded and ungrounded branch circuit supply conductors but is identifiable by green and yellow stripes is installed as part of the branch circuit that supplies the unit. The grounding conductor is a separately derived system at the supply transformer or motor generator set.



**WARNING:** When you install the switch, the ground connection must always be made first and disconnected last.

**Waarschuwing** Bij de installatie van het toestel moet de aardverbinding altijd het eerste worden gemaakt en het laatste worden losgemaakt.

**Varoitus** Laitetta asennettaessa on maahan yhdistäminen aina tehtävä ensiksi ja maadoituksen irti kytkeminen viimeiseksi.



**Attention** Lors de l'installation de l'appareil, la mise à la terre doit toujours être connectée en premier et déconnectée en dernier.

**Warnung** Der Erdanschluß muß bei der Installation der Einheit immer zuerst hergestellt und zuletzt abgetrennt werden.

**Avvertenza** In fase di installazione dell'unità, eseguire sempre per primo il collegamento a massa e disconnetterlo per ultimo.

**Advarsel** Når enheten installeres, må jordledningen alltid tilkobles først og frakobles sist.

**Aviso** Ao instalar a unidade, a ligação à terra deverá ser sempre a primeira a ser ligada, e a última a ser desligada.

**¡Atención!** Al instalar el equipo, conectar la tierra la primera y desconectarla la última.

**Varning!** Vid installation av enheten måste jordledningen alltid anslutas först och kopplas bort sist.

#### Related Topics

- General Safety Guidelines and Warnings for EX Series Switches on page 263
- General Electrical Safety Guidelines and Warnings for EX Series Switches on page 291
- DC Power Electrical Safety Guidelines for EX Series Switches on page 296
- DC Power Disconnection Warning for EX Series Switches on page 297
- DC Power Wiring Sequence Warning for EX Series Switches on page 299
- DC Power Wiring Terminations Warning for EX Series Switches on page 301

## DC Power Wiring Sequence Warning for EX Series Switches



**WARNING:** Wire the DC power supply using the appropriate lugs. When connecting power, the proper wiring sequence is ground to ground, +RTN to +RTN, then –48 V to –48 V. When disconnecting power, the proper wiring sequence is –48 V to –48 V, +RTN to +RTN, then ground to ground. Note that the ground wire must always be connected first and disconnected last.

**Waarschuwing** De juiste bedradingsvolgorde verbonden is aarde naar aarde, +RTN naar +RTN, en –48 V naar –48 V. De juiste bedradingsvolgorde losgemaakt is en –48 naar –48 V, +RTN naar +RTN, aarde naar aarde.

**Varoitus** Oikea yhdistettävä kytkentäjärjestys on maajohto maajohtoon, +RTN varten +RTN, –48 V varten –48 V. Oikea irrotettava kytkentäjärjestys on –48 V varten –48 V, +RTN varten +RTN, maajohto maajohtoon.

**Attention** Câblez l'alimentation CC En utilisant les crochets appropriés à l'extrémité de câblage. En reliant la puissance, l'ordre approprié de câblage

est rectifié pour rectifier, +RTN à +RTN, puis -48 V à -48 V. En débranchant la puissance, l'ordre approprié de câblage est -48 V à -48 V, +RTN à +RTN, a alors rectifié pour rectifier. Notez que le fil de masse devrait toujours être relié d'abord et débranché pour la dernière fois. Notez que le fil de masse devrait toujours être relié d'abord et débranché pour la dernière fois.

**Warnung** Die Stromzufuhr ist nur mit geeigneten Ringösen an das DC Netzteil anzuschliessen. Die richtige Anschlusssequenz ist: Erdanschluss zu Erdanschluss, +RTN zu +RTN und dann -48V zu -48V. Die richtige Sequenz zum Abtrennen der Stromversorgung ist -48V zu -48V, +RTN zu +RTN und dann Erdanschluss zu Erdanschluss. Es ist zu beachten dass der Erdanschluss immer zuerst angeschlossen und als letztes abgetrennt wird.

**Avvertenza** Mostra la morsettiera dell alimentatore CC. Cablare l'alimentatore CC usando i connettori adatti all'estremità del cablaggio, come illustrato. La corretta sequenza di cablaggio è da massa a massa, da positivo a positivo (da linea ad L) e da negativo a negativo (da neutro a N). Tenere presente che il filo di massa deve sempre venire collegato per primo e scollegato per ultimo.

**Advarsel** Riktig tilkoples tilkoplingssekvens er jord til jord, +RTN til +RTN, -48 V til -48 V. Riktig frakoples tilkoplingssekvens er -48 V til -48 V, +RTN til +RTN, jord til jord.

**Aviso** Ate con alambre la fuente de potencia cc Usando los terminales apropiados en el extremo del cableado. Al conectar potencia, la secuencia apropiada del cableado se muele para moler, +RTN a +RTN, entonces -48 V a -48 V. Al desconectar potencia, la secuencia apropiada del cableado es -48 V a -48 V, +RTN a +RTN, entonces molió para moler. Observe que el alambre de tierra se debe conectar siempre primero y desconectar por último. Observe que el alambre de tierra se debe conectar siempre primero y desconectar por último.

**Atenção!** Wire a fonte de alimentação de DC Usando os talões apropriados na extremidade da fiação. Ao conectar a potência, a seqüência apropriada da fiação é moída para moer, +RTN a +RTN, então -48 V a -48 V. Ao desconectar a potência, a seqüência apropriada da fiação é -48 V a -48 V, +RTN a +RTN, moeu então para moer. Anote que o fio à terra deve sempre ser conectado primeiramente e desconectado por último. Anote que o fio à terra deve sempre ser conectado primeiramente e desconectado por último.

**Varning!** Korrekt kopplingssekvens ar jord till jord, +RTN till +RTN, -48 V till -48 V. Korrekt kopplas kopplingssekvens ar -48 V till -48 V, +RTN till +RTN, jord till jord.

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**Related Topics**

- General Safety Guidelines and Warnings for EX Series Switches on page 263
- General Electrical Safety Guidelines and Warnings for EX Series Switches on page 291
- DC Power Electrical Safety Guidelines for EX Series Switches on page 296
- DC Power Disconnection Warning for EX Series Switches on page 297
- DC Power Grounding Requirements and Warning for EX Series Switches on page 298

- DC Power Wiring Terminations Warning for EX Series Switches on page 301

## DC Power Wiring Terminations Warning for EX Series Switches



**WARNING:** When stranded wiring is required, use approved wiring terminations, such as closed-loop or spade-type with upturned lugs. These terminations must be the appropriate size for the wires and must clamp both the insulation and conductor.

**Waarschuwing** Wanneer geslagen bedrading vereist is, dient u bedrading te gebruiken die voorzien is van goedgekeurde aansluitpunten, zoals het gesloten-lus type of het grijperschop type waarbij de aansluitpunten omhoog wijzen. Deze aansluitpunten dienen de juiste maat voor de draden te hebben en dienen zowel de isolatie als de geleider vast te klemmen.

**Varoitus** Jos säikeellinen johdin on tarpeen, käytä hyväksyttyä johdinliitääntää, esimerkiksi suljettua silmukkaa tai kourumaista liitääntää, jossa on ylöspäin käännetyt kiinnityskorvat. Tällaisten liitääntöjen tulee olla kooltaan johtimiin sopivia ja niiden tulee puristaa yhteen sekä eristeen että johdinosan.

**Attention** Quand des fils torsadés sont nécessaires, utiliser des douilles terminales homologuées telles que celles à circuit fermé ou du type à plage ouverte avec cosses rebroussées. Ces douilles terminales doivent être de la taille qui convient aux fils et doivent être refermées sur la gaine isolante et sur le conducteur.

**Warnung** Wenn Litzenverdrahtung erforderlich ist, sind zugelassene Verdrahtungsabschlüsse, z.B. für einen geschlossenen Regelkreis oder gabelförmig, mit nach oben gerichteten Kabelschuhen zu verwenden. Diese Abschlüsse sollten die angemessene Größe für die Drähte haben und sowohl die Isolierung als auch den Leiter festklemmen.

**Avvertenza** Quando occorre usare trecce, usare connettori omologati, come quelli a occhiello o a forcella con linguette rivolte verso l'alto. I connettori devono avere la misura adatta per il cablaggio e devono serrare sia l'isolante che il conduttore.

**Advarsel** Hvis det er nødvendig med flertrådede ledninger, brukes godkjente ledningsavslutninger, som for eksempel lukket sløyfe eller spadetype med oppoverbøyde kabelsko. Disse avslutningene skal ha riktig størrelse i forhold til ledningene, og skal klemme sammen både isolasjonen og ledere.

**Aviso** Quando forem requeridas montagens de instalação eléctrica de cabo torcido, use terminações de cabo aprovadas, tais como, terminações de cabo em circuito fechado e planas com terminais de orelha voltados para cima. Estas terminações de cabo deverão ser do tamanho apropriado para os respectivos cabos, e deverão prender simultaneamente o isolamento e o fio condutor.

**¡Atención!** Cuando se necesite hilo trenzado, utilizar terminales para cables homologados, tales como las de tipo "bucle cerrado" o "espada", con las lengüetas de conexión vueltas hacia arriba. Estos terminales deberán ser del tamaño apropiado para los cables que se utilicen, y tendrán que sujetar tanto el aislante como el conductor.

**Varning!** När flertrådiga ledningar krävs måste godkända ledningskontakter användas, t.ex. kabelsko av slutan eller öppen typ med uppåtvänd tapp. Storleken på dessa kontakter måste vara avpassad till ledningarna och måste kunna hålla både isoleringen och ledaren fastklämda.

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- Related Topics**
- General Safety Guidelines and Warnings for EX Series Switches on page 263
  - General Electrical Safety Guidelines and Warnings for EX Series Switches on page 291
  - DC Power Electrical Safety Guidelines for EX Series Switches on page 296
  - DC Power Disconnection Warning for EX Series Switches on page 297
  - DC Power Grounding Requirements and Warning for EX Series Switches on page 298
  - DC Power Wiring Sequence Warning for EX Series Switches on page 299

## Multiple Power Supplies Disconnection Warning for EX Series Switches

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**WARNING:** For EX Series switches that have more than one power supply connection, you must ensure that all power connections are fully disconnected so that power to the switch is completely removed.

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- Related Topics**
- General Safety Guidelines and Warnings for EX Series Switches on page 263
  - General Electrical Safety Guidelines and Warnings for EX Series Switches on page 291
  - AC Power Electrical Safety Guidelines for EX Series Switches on page 294
  - DC Power Electrical Safety Guidelines for EX Series Switches on page 296

## TN Power Warning for EX Series Switches

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**WARNING:** The switch is designed to work with a TN power system.

**Waarschuwing** Het apparaat is ontworpen om te functioneren met TN energiesystemen.

**Varoitus** Koje on suunniteltu toimimaan TN-sähkövoimajärjestelmien yhteydessä.

**Attention** Ce dispositif a été conçu pour fonctionner avec des systèmes d'alimentation TN.

**Warnung** Das Gerät ist für die Verwendung mit TN-Stromsystemen ausgelegt.

**Avvertenza** Il dispositivo è stato progettato per l'uso con sistemi di alimentazione TN.

**Advarsel** Utstyret er utfomet til bruk med TN-strømsystemer.

Aviso O dispositivo foi criado para operar com sistemas de corrente TN.

¡Atención! El equipo está diseñado para trabajar con sistemas de alimentación tipo TN.

Varning! Enheten är konstruerad för användning tillsammans med elkraftssystem av TN-typ.

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- Related Topics**
- General Safety Guidelines and Warnings for EX Series Switches on page 263
  - General Electrical Safety Guidelines and Warnings for EX Series Switches on page 291
  - Grounded Equipment Warning for EX Series Switches on page 282
  - Multiple Power Supplies Disconnection Warning for EX Series Switches on page 302

### In Case of Electrical Accident: Action to Take on an EX Series Switch

If an electrical accident results in an injury, take the following actions in this order:

1. Use caution. Be aware of potentially hazardous conditions that could cause further injury.
2. Disconnect power from the switch.
3. If possible, send another person to get medical aid. Otherwise, assess the condition of the victim, then call for help.

- Related Topics**
- General Safety Guidelines and Warnings for EX Series Switches on page 263
  - General Electrical Safety Guidelines and Warnings for EX Series Switches on page 291
  - AC Power Electrical Safety Guidelines for EX Series Switches on page 294
  - DC Power Electrical Safety Guidelines for EX Series Switches on page 296



PART 9

# Compliance Information

- [Compliance Information on page 307](#)





## CHAPTER 21

# Compliance Information

- Agency Approvals for EX Series Switches on page 307
- Battery Compliance Statement for Environmental Requirements for EX Series Switches on page 308
- Compliance Statements for EMC Requirements for EX Series Switches on page 308
- Compliance Statements for Acoustic Noise for EX Series Switches on page 311
- Declaration of Conformity for EX8208 Switches on page 311

### Agency Approvals for EX Series Switches

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EX Series switches comply with the following standards:

- Safety
  - CAN/CSA-22.2 No. 60950-1-03/UL 60950-1. Safety of Information Technology Equipment
  - EN 60950-1:2001. Safety of Information Technology Equipment
  - EN 60825-1 Safety of Laser Products – Part 1: Equipment Classification, Requirements and User's Guide
- EMC
  - FCC 47CFR Part 15 Class A (USA)
  - EN 55022 Class A Emissions (Europe)
  - ICES-003 Class A
  - VCCI Class A (Japan)
  - AS/NZS CISPR 22 Class A (Australia/New Zealand)
  - CISPR 22 Class A
  - EN 55024
  - EN 300386
  - EN 61000-3-2 Power Line Harmonics

- EN 61000-3-3 Voltage Fluctuations and Flicker
- EN 61000-4-2 ESD
- EN 61000-4-3 Radiated Immunity
- EN 61000-4-4 EFT
- EN 61000-4-5 Surge
- EN 61000-4-6 Low Frequency Common Immunity
- EN 61000-4-11 Voltage Dips and Sags

- Related Topics**
- Compliance Statements for EMC Requirements for EX Series Switches on page 308
  - Compliance Statements for Acoustic Noise for EX Series Switches on page 311

## Battery Compliance Statement for Environmental Requirements for EX Series Switches

EX8200 Ethernet switches contain lithium batteries.

Batteries used in these switches are not based on substances containing mercury, lead, or cadmium. The batteries used in these switches comply with EU Directives 91/157/EEC, 93/86/EEC, and 98/101/EEC. The product documentation includes instructional information on the proper method of reclamation and recycling.

- Related Topics**
- Agency Approvals for EX Series Switches on page 307
  - Compliance Statements for EMC Requirements for EX Series Switches on page 308

## Compliance Statements for EMC Requirements for EX Series Switches

This topic describes the EMC requirements for EX Series switches for:

- Canada on page 308
- European Community on page 309
- Japan on page 309
- United States on page 309
- FCC Part 15 Statement on page 310
- Non-Regulatory Environmental Standards on page 310

### Canada

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

The Industry Canada label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective, operational, and

safety requirements. Industry Canada does not guarantee the equipment will operate to the users' satisfaction.

Before installing this equipment, users should ensure that it is permissible to connect the equipment to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the inside wiring associated with a single line individual service may be extended by means of a certified connector assembly. The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.



**CAUTION:** Users should not attempt to make electrical ground connections by themselves, but should contact the appropriate inspection authority or an electrician, as appropriate.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines, and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

## European Community

This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

## Japan

この装置は、クラス A 情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。 VCCI-A

The preceding translates as follows:

This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

VCCI-A

## United States

The EX Series switch has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

## FCC Part 15 Statement

This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try and correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio or TV technician for help.

## Non-Regulatory Environmental Standards

**NEBS compliance**—These EX Series switch models are Network Equipment Building System (NEBS) compliant:

- EX2200-24T and EX2200-48T
- EX3200-24T, EX3200-48T, EX4200-24F, EX4200-24T, and EX4200-48T
- All EX8200 models

Those switch models meet the following NEBS compliance standards:

- SR-3580 NEBS Criteria Levels (Level 3 Compliance)
- GR-1089-CORE: EMC and Electrical Safety for Network Telecommunications Equipment
- GR-63-CORE: NEBS, Physical Protection
  - The equipment is suitable for installation as part of the Common Bonding Network (CBN).
  - The equipment is suitable for installation in locations where the National Electrical Code (NEC) applies.
  - The battery return connection is to be treated as an Isolated DC return (DC-I), as defined in GR-1089-CORE.

- Related Topics**
- Agency Approvals for EX Series Switches on page 307
  - Compliance Statements for Acoustic Noise for EX Series Switches on page 311

## Compliance Statements for Acoustic Noise for EX Series Switches




Maschinenlärminformations-Verordnung - 3. GPSGV, der höchste Schalldruckpegel beträgt 70 dB(A) oder weniger gemäss EN ISO 7779

Translation:

The emitted sound pressure is below 70 dB(A) per EN ISO 7779.

- Related Topics**
- Agency Approvals for EX Series Switches on page 307
  - Compliance Statements for EMC Requirements for EX Series Switches on page 308

## Declaration of Conformity for EX8208 Switches

	
<b>Declaration of Conformity</b>	
	
Juniper Networks, Inc. 1194 N. Mathilda Ave Sunnyvale, CA. 94089 USA	
declares that under our sole responsibility the product(s)	
<b>EX8208 Ethernet Switch</b>	
are in conformity with the provisions of the following EC Directives, including all amendments, and with national legislation implementing these directives:	
<b>Low Voltage Directive 73/23/EEC</b> <b>EMC Directive 89/336/EEC</b>	
and that the following harmonized standards have been applied	
<ul style="list-style-type: none"> <li>• EN 300 386 V1.3.3 (2005) Telecom Network Equipment - EMC requirements (Telco Center)</li> <li>• FCC Part 15 Class A (2007) USA Radiated Emissions</li> <li>• EN 55022 Class A (2006) European Radiated Emissions</li> <li>• VCCI Class A (2007) Japanese Radiated Emissions</li> <li>• EN 55024 +A1+A2 (1998) Information Technology Equipment Immunity Characteristics</li> <li>• EN-61000-3-2 (2006) Power Line Harmonics</li> <li>• EN-61000-3-3 +A1 +A2 +A3 (1995) Power Line Voltage Fluctuations</li> <li>• EN-61000-4-2 +A1 +A2 (1995) Electrostatic Discharge</li> <li>• EN-61000-4-3 +A1+A2 (2002) Radiated Immunity</li> <li>• EN-61000-4-4 (2004) Electrical Fast Transients</li> <li>• EN-61000-4-5 (2006) Surge</li> <li>• EN-61000-4-6 (2007) Immunity to Conducted Disturbances</li> <li>• EN-61000-4-11 (2004) Voltage Dips and Sags</li> <li>• EN60950-1:2001+A11</li> </ul>	
Place Sunnyvale, CA	 Bill Presley Compliance Engineer
	Date 04/10/2009
	s021003

- Related Topics**
- Agency Approvals for EX Series Switches on page 307
  - Compliance Statements for EMC Requirements for EX Series Switches on page 308
  - Compliance Statements for Acoustic Noise for EX Series Switches on page 311

